"THE APPLICATION OF CLASSIFICATION AND CODING IN THE FIELD OF ACCOUNTANCY".

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C H A P T E R O N E .

INTRODUCTION.

011. The Purpose.

In the year 1494 Luca Paciolà published in Venice his 'Summa di Arithmetica', containing a section on double entry book-keeping entitled 'De Computis et Scripturis'. This was a statement of principles already practised for a considerable period of time, but it constituted a landmark in the history of accounting. Since then accountancy has made considerable progress, particularly in the present century, and to-day the accountant is becoming less and less of a book-keeper and more and more the right-hand of enlightened management.

This re-orientation of accountancy has made necessary a review of the principles underlying the compilation of accounting statements and an examination of the manner in which original entries are defined and classified.

The purpose of this thesis is to consider in what manner and to what extent taxonomic principles and symbolic representation can be applied in the accountancy field.

It is proposed first to state the taxonomic principles likely to be of service to the accountant, secondly to consider various forms of symbolic representation with their relative advantages and disadvantages and finally to discuss the application of such principles and forms of representation in the field of accountancy.

012. The Principles of Classification.

Taxonomy may be defined as the science of classification, the latter being understood as the sorting of units into groups of a like nature, the units being anything from abstract ideas to physical objects. As the items dealt with may not always be physical objects, it is useful to adopt a suggestion made some years ago by Professor Lom of Leyden. He suggested that the subject matter under discussion for classification should be considered as consisting of a number of units each one of which is known as a Taxon, (plural "Taxa").

Taxa are sorted into groups according to resemblances or differences between individual units, or the possession or lack of certain common attributes.

The sorting of taxa into groups implies that there has previously been fixed the general nature of the attributes, the presence or absence of which will cause the taxa to fall into different groups or sub-groups. The selection of these attributes before beginning the sorting process indicates that the classification is a subjective one designed to carry out some pragmatical end, such as the reduction of a large mass of accounting data to a number of groups and sub-groups arranged in a systematic and logical sequence of homogeneous groups.

As the classification is based on the purposes which are in mind at the time the classification is made, it follows that the classification is likely to be temporal and transitory, because the extent of our knowledge or the purposes for which the classification is needed will change in course of time, thus requiring a revision of the particular system of classification adopted.

013. The History of Classification.

It is of interest to consider some of the attempts which have been made from the earliest times to classify human knowledge. The history of theoretical classification may be said to have begun with the work of Aristotle (B.C.384 - 322) who divides knowledge into the following categories -

Theoretical:

Mathematics

Physics

Metaphysics

Practical (or Ethics):

Law

Politics

Economics

Creative Art

A more utilitarian system was adopted by the industrious Pliny (A.D.32 - 79) whose system was arranged in a sequence intended to represent the relative importance of the various heads :

Astronomy (which deals with the Universe)

Geography (this heading dealt with matters relating to the Earth itself)

Man

Animals

Plants, including Agriculture and Horticulture

Medicine

Metallurgy

Art

Over two hundred years later we come to the work of Porphyry whose name has been given to the dichotomous method of classifying taxa, under which the items to be classified are divided into two groups, one of which contains the attribute in question and the other does not; the second group is disregarded in the further stages of classifying the first group of taxa. The system of Porphyry is dated about the year 300 A.D. and a further substantial gap appears before we come to the systems of Bede (A.D.673 - 735) whose system is not all embracing but deals with the physical aspect of knowledge under the Formation and Nature of the Universe, and the Nature of the Elements. These are followed by what we may term Astronomy, Meteorology, Oceanology, Geology and Geography.

Some five hundred years later we find Roger Bacon (Circa 1214 - 1294) making use in his "Opus Maius" of the dichotomous principle to which we have already referred and which is known as the Tree of Porphyry. The latter is sometimes also mentioned as the Ramean Tree after a

French writer of the sixteenth century who made extensive use of this bi-furcate principle.

Another four hundred years elapsed before the "Advancement of Learning" by Francis Bacon (1561 - 1626) was published posthumously in 1645. The theory of classification adopted was related to the processes of the mind : The use of Memory (history), Imagination (poetry) and Reason (science).

The steady increase in the number of classificatory headings over the years was, of course, but a reflection of the increase in the corpus of knowledge to be classified, both in volume and in variety. Fundamentally however they are little different in conception from the original classification of knowledge employed by Aristotle.

After Bacon we come to Carl Linnaeus (1707 - 1778) whose "Systema Natural Fundamenta Botanica", published over the years 1735 to 1738 provides a starting point for all subsequent classification of plants. Linnaeus has been aptly described as the father of modern systematic botany as he was the first to make use of specific names in the nomenclature of plants.

Exactly twenty years after the death of Linnaeus there was born August Comte (1798 - 1857) who developed the idea that all human conceptions passed through three stages, these being a theological stage, a metaphysical stage and finally an experimental (or positive stage). His classification was outlined in "Positive Philosophy" published between 1830 and 1842. The classification of the abstract sciences formed a hierarchy according to the degree of generality namely :-

mathematics, astronomy, physics, chemistry, biology and sociology.

A criticism of this serial arrangement of the sciences was made by Herbert Spencer (1820 - 1903) in his "Classification of the Sciences" (1864). Spencer proposed a classification according to abstractness as follows :

Abstract sciences - Logic and Mathematics

Abstract - concrete sciences - Mechanics, physics, chemistry, etc.

Concrete Sciences - Astronomy, geology, biology, psychology, sociology.

In this brief survey no mention has been made of John Locke (1662 - 1704) "Essay Concerning Human Understanding"; or of Samuel Taylor Coleridge (1772 - 1834) for his contribution in the "Essay on Method".

In the"Grammar of Science" Karl Pearson (1851 - 1926) divided his subject matter into three sections, the headings of which were Abstract Science, Concrete Science (Precise Physical Sciences) and Concrete Science (Organic Phenomena).

While on the one hand botany, chemistry and physics have become known as the classificatory sciences, on the bibliothetic side the ever-increasing output of the printing press has provided scope for fresh systems of classifying books and knowledge in general. The most widely known system of classification relating to books is that devised by Melvil Dewey (1851 - 1931) formerly librarian of Amherst College Library, Amherst, Massachussetts, U.S.A. The system was first employed in 1873, and Dewey submitted it as his Thesis for his Master's Degree in

the year 1875, but it was not published until 1876. The system is widely used by libraries. The Dewey system of classification, like all previous attempts at the classification of knowledge, is a child of its age, and only by constant modification can it ever attempt to keep up with modern developments. The Dewey method of symbolisation, to be considered later, constitutes Dewey's significant contribution to knowledge.

In 1895 a conference on bibliographical matters was held in Brussels, as a result of which an Institute was created, ultimately becoming in 1937 the International Federation for Documentation. At the conference in 1895 it was agreed to adopt Dewey's system as the basis of a new subject index, and from this has grown the Universal Decimal Classification.

Throughout the last two thousand years men of great intellect have found the need to build for themselves a classificatory structure which would hold the sum-total of knowledge as it existed in their day. Yet, as time went on and knowledge expanded, each classification in turn was found to have defects which later writers corrected in their own systems, only to be superseded in turn by the schemes prepared by later generations to satisfy the ever-expanding field of human knowledge.

014. The Nature of Classification.

The process of sorting taxonomic units into various groups yields results which are of an empirical and pragmatical nature. Even such an

apparently clear cut distinction as the division into male and female may not be the perfect one for all purposes. Our pre-conceived attributes "Maleness" and "Femaleness" are so inexplicably mixed up in differing proportions in all animals that it is impossible to effect a division which will segregate animals into male and female so as to provide for all the taxa, which may arise at every stage of their existence. A change of sex, though rare, is not unknown amongst mankind. Such a metamorphosis is not infrequent amongst lower types of existence such as the ordinary farmyard fowl.

In the field of library classification, endless attempts have been made to provide a system which would be of permanent use but one of the recognised authorities of the present day, Henry Evelyn Bliss, states that the arrangement of books will be most useful if it conforms to "the organisation of knowledge established in the scientific and educational consensus". In other words the books are to be arranged in the order which a person living at the present time and with a knowledge of a particular subject, would be most likely to adopt when searching for a book on the shelves of a library. Naturally, this scientific and educational consensus will change and develop in the course of time as our knowledge expands and as attention is directed towards subjects which have hitherto escaped notice. For example, in these days there is a growing literature on the subject of atomic energy and cognate matters. Again, in the accountancy sphere greater consideration is now being given to the subject of budgetary control and standard costing,

so that any classification of books on costing made some thirty years ago would probably be found inadequate for present day requirements.

In the industrial sphere, existing classifications of Works Stores are liable to be dislocated by the requirements of new products or new types of plant and machinery in use in the works.

We may say therefore, that when we have to deal with a large mass of unsorted taxonomic units, or taxa as we call them, the only method of dealing with such taxa for practical purposes is to divide the total number into groups of a like nature, these groups being termed classes.

This breaking down of a mass into classes is a process of sorting and grouping together taxa having one or more attributes in common.

The classifier selects from the total of attributes possessed by any taxon only those attributes which are appropriate to the purpose he has in mind. Therefore his selection of classes is subjective and pragmatic. For example, books may be classified according to their subject matter; or according to the manner in which they are bound; or they may be grouped according to the name of the author. It all depends on the point of view of the person making the arrangement and the purposes which he has in mind.

It follows that in making his selection of attributes the classifier is restricted by the extent of his own knowledge at the time he makes the selection. In the light of further knowledge his selection of attributes might be very different. Accordingly, any classification is in a greater or less degree ephemeral and, by its very nature, limited

in its general application to all times and in all circumstances. The smaller the number of taxa in the population to be classified the more transitory will be the life of the resulting classification. For the items in question the classification will probably be simple and easy to use. In such a classification involving relatively few taxa it may be expected that there will still be a large range of taxa falling outside the particular classification and this will naturally render the original classification subject to dislocation should many new items require to be added to it.

On the other hand, the greater the number of taxa in the population to be classified, the less likely is it that additional items will arise for a number of years after the classification is made and accordingly the classification should have the advantage of a longer life. If, however, there should be a change in the point of view of the person making the classification or should there be a change of emphasis in the constituent classes then a rearrangement of the items in the classification may become necessary.

It was Lord Kelvin who observed that we could claim to know little about anything unless and until we could measure it. Measurements however, are of little value unless we know precisely what it is that we are measuring. Accordingly, the definition of taxonomic units and their grouping into classes is fundamental to intelligent measurement, without which our knowledge of most subjects is likely to be scanty. Classification may therefore be said to be at the root of all knowledge.

Indeed, Jevons has said "that science can extend only as far as the power of accurate classification extends".

015. Symbolisation.

Classification represents the sorting of things into classes, and this process can be carried out without any thought of assigning symbols to the items in the classified list. Indeed few, if any, of the classifiers mentioned earlier allocated symbols to the items in their classification. On the other hand, it is equally possible to have symbolisation without classification and this is only too evident from a perusal of many lists of numbers assigned to the items held in industrial stores.

Symbolisation consists in assigning some recognised mark to each item in a list of taxonomic units, whether or not units have been classified in an orderly manner.

It will be observed that for practical purposes a symbol must be some widely recognised mark and in our consideration of this section of our subject we shall consider symbols in the following four categories:

1. Symbols other than numbers or letters of the alphabet.
2. Purely alphabetical systems.
3. Mixed alphabetical-numerical systems.
4. Purely numerical systems.

For practical purposes the fourth method is probably the most useful and the first method the least useful for accountancy purposes.

Under the first category we may mention pictorial symbols such as the ideographs used by the ancient Egyptians and also by the Chinese. These symbols are highly stylised pictures but they do represent things or ideas.

In almost all countries road signs bear symbols which may be indicative of the thing described, as for example, the road sign in Great Britain which indicates a double bend, or a level crossing or the narrowing of a road.

An interesting example was the use in the recent Gold Coast elections of representative symbols to enable illiterate native electors to distinguish between various candidates.

In the charting of motion study elements, shapes such as triangles, circles and squares are employed to speed up the process of recording, or to provide a visual description of the number of times a piece of material may be moved or may remain in a static position in the course of manufacture. Movements may also be translated into symbols so as to convey information as by the use of semaphore.

A combination of symbols and letters has been suggested for use in the visiting list of medical practitioners. For example, an oblique stroke signifies that a visit has been made and if medicine is to be sent a horizontal stroke is joined to the lower portion of the first oblique stroke as now shown /_ . When the medicine has been sent the letter Z is completed in the Doctor's record book.

Pictorial symbols are in considerable use in industry and an example may be found in British Standard 1553, Part 1, 1949, which relates to symbols for general engineering, with particular reference to pipes and valves.

Under this category of symbols we may also consider the use of colour codes. In Glasgow, the tramway cars were formerly identified by a band of colour which encircled the car in a prominent position. This made it easy to tell from a distance which route the car would take. That is to say, the routes were colour coded. As the tramway systems extended, there were not sufficient contrasting colours so that it became necessary to use numbers to indicate the route which the car would take.

In the description of a central lubrication service installed in a Dutch factory, it is mentioned that a colour is assigned to each brand of oil and grease and in addition, the frequency of lubrication is represented by a special symbol. Thereafter each machine is marked with the appropriate symbol indicating the frequency of lubrication, the symbol being painted in the colour code of the oil most suited to the particular machine. An additional point is that the drums of oil are painted in the relative colours.

Colour codes are also used to distinguish radio components, and metal bars in engineering stores. The disadvantage of colour codes is, of course, that they are not of great service to the colour blind section of the population and secondly their application is somewhat limited as illustrated by the identification of tramway cars mentioned above.

Before leaving this section, mention may be made of the Morse Code as a further example of the use of symbols other than letter or figures.

The second category of symbols to which we referred was the purely alphabetical systems in which letters of the alphabet are used to indicate the items ih a classification. Letters have the advantage that by use of a single symbol more headings can be encompassed than by the use of the numerical system running from 0 to 9. As, however, it is found preferable not to use the letters I, J, O, Q and Z, the number of letters of the alphabet is reduced to 21, and this reduces the advantage as compared with numerical systems.

The extensive use of letters is not recommended for practical use as the symbols become cumbersome to speak and write. Moreover, errors of transcription are of greater frequency. For practical purposes code symbols must be easily comprehended and translated into an impression which can be readily remembered and utilised by the mind. In addition, the symbols must be readily spoken and letters do not combine so readily as figures in this respect.

One apparent advantage of using letters is that the items in the classification can be symbolised by the use of the first letter of the words in question, but the disadvantage is that two or more items may begin with the same letter. For example, even in so short a series as the days of the week one finds that two days begin with T and two days begin with the letter S. Again with regard to the months of the year, January, June and July all begin with the same letter, as do April and August.

The third category of symbols referred to was the mixed alphabetical-numerical type. The numbering system adopted for motor car registration purposes in Great Britiain is an example of this category.

Another illustration of this type of symbol is found in the identity numbers used on identification cards.

In a very large population, and merely for identification purposes at rare intervals a combined alphabetical-numerical system may have advantages, but for industrial and commercial purposes, there is little to recommend this type of notation.

Coming now to the fourth category of symbol, it may be said at once that the purely numerical systems are the most widely used in business. Such systems are of course the most suitable for mechanical book-keeping operations, whether or not the system functions by means of punched cards or by means of keyboard type machines. The use of figures has much to commend it, because they are distinctive, and unlike letters, figures combine easily when spoken and are easy to comprehend. Of more importance even is the ability of figures to indicate the relative position of two symbols and also to indicate the number of items between the two symbols. For example, it is not immediately clear that the range between F and P represents the difference between 6 and 16.

Particular numbers can also acquire the ease in use of ordinary names. For example, when we talk of "an A40 car" we do not say to ourselves that this number signifies the fortieth item in a particular series; it is merely a name, but certainly a distinctive one. Or again,

in Glasgow there is a restaurant called the "One-O-One". In fact, it is situated at No. 101, Hope Street. When referring to this restaurant one uses the expression "One-O-One", without attaching any numerical significance to it. This feature should be borne in mind when considering the relative merits of an alphabetical mnemonic notation as compared with numerical symbols. In other words, it is suggested that particular numbers can readily acquire the ease in use of an ordinary name, but in addition, the numbers retain all their value as non-ambiguous symbols of identity and they indicate the position of an item relative to all the others with great facility.

Numbers can be utilised in various ways so as to fit the list of items making up the classification and this aspect of the subject will be discussed in greater detail in a subsequent chapter.

Finally, mention may again be made of the important contribution made by Melvil Dewey. The classification which he made has been revised and is being continuously scrutinised and remodelled in various sections, but his conception of decimal symbolisation, new at the time, represents his significant contribution to the general subject of the organisation of knowledge. It is the basis of most modern systems of referencing.

016. Principles of Classification Applied to Accounting.

While the subject of classification of accounts has engaged the attention of accountants for many years, there have been few, if any, attempts to formulate the basic principles which should be used in

creating a classification, and almost invariably the schemes produced are of an ad hoc nature, subject to change as the circumstances of business are modified by internal or external pressures.

The fault may well lie in the failure to investigate thoroughly the basic nature of each type of expense, as a result of which the various classifications in use combine expenses of different types and frequently take little account of the distinction between the nature of an expense and the purpose for which the expenditure is incurred.

In Great Britain the position has been further complicated by the artificial distinction between what are known as the financial accounts of a business and the cost accounts of the same business.

While the passing of the various Companies Acts in Great Britain over the last hundred years may have given the investor safeguards superior to almost every other country in the world, the time and attention devoted to these quasi-legal matters has reacted to the detriment of the development of accountancy as such.

Company legislation, and in later years the taxation of profits, created an assured and recurring market for the wares of the accountant, in public practice. Little wonder that these accountants were content to exercise their profession in this profitable field of employment and found no reason to investigate the underlying nature of expenditure and revenue so as to elucidate general principles on which all accounting systems might rest.

The seeds of progress were sown, not by accountants, but by managers and administrators whose need compelled them to develop systems of accounting and cost accounting to fill the vacuum caused by the absence of any significant creative effort on the part of public accountants of the time.

In 1887 there appeared the first edition of "Factory Accounts" by Emile Garcke and J.M. Fells, the former being managing director of British Electric Traction Company Limited and the latter at one time the general manager of the Salt Union Limited. This book ran through several editions, the fifth being published in 1902. By this time, however, J. Slater Lewis had produced his book on the "Commercial Organisation of Factories".

Lewis pointed out that despite the technical progress which had been made during the previous hundred years each manufacturer still devised his own peculiar system of accounts. There was no recognised system which students could learn or schools could teach. It was also observed that there were no examinations by means of which managers and others could receive certificates of proficiency in one universally accepted system. It is interesting to note that the author of the book considered that accountancy was a proper subject for study by managers as well as by accountants. It seemed strange to Lewis, as it does now to us, that - except in the matter of accounting, - engineering operations have been endowed with recognised formulae, tables and data of every type and description. As he pointed out, the State has given recognition

that such knowledge is of national importance so that technical schools and other institutions needed by the State were created in the days of Lewis and have of course continued until the present day. Lewis wondered, as well he might, whether the legislature would ever recognise the exact relationship between "successful engineering and scientific bookkeeping, and afford the rising generation opportunities of qualifying themselves for positions where both are indispensable conditions". Lewis was the general manager of P.R. Jackson and Company Limited, Engineers, Salford Rolling Mills, Manchester.

Some twenty-three years after the first publication of Lewis' book the Institute of Cost and Works Accountants was founded (1919) and Lewis' vision of an institute to co-ordinate knowledge of general accounting technique began to take shape; but much remained and still remains to be done.

The third pioneer in our story is Edward T. Elbourne whose "Factory Administration and Accounts" first appeared in 1914, marking an important stage in the development of factory administration and cost accounting. Various impressions and editions of the book were published, until, thirty years after the first date of issue, a students edition was published in 1934.

If Slater Lewis could be said to have foreseen the creation of the Institute of Cost and Works Accountants, the development of Elbourne's thoughts led him to found in 1920 the Institute of Industrial Administration, which has recently been re-incorporated as a professional Institute within the framework of the British Institute of Management.

Accountants are also indebted to T.G. Rose for his book on "Higher Control", first published in 1934, with a fourth edition ten years later which was reprinted in 1945, 1946 and 1947.

It is perhaps comforting for accountants to note that one of the earliest books dealing with standard costing was written by the distinguished American accountant G. Charter Harrison, and first published in 1930.

No conscious attempt appears to have been made by these pioneers to isolate and develop the taxonomic principles applicable in the field of accounting, but the development of accounting procedures and forms of accounting statements suitable to a modern age has created a concomitant need for a detailed examination of the principles of classification relative to accountancy.

In the classification of accounts, the principal need is to recognise that expenditure can be classified only in one way at one time. Payments can be classified either according to the nature of the payments, such as wages, or the object for which the payment has been made, such as the driving of transport, the stoking of a boiler, or for direct work on the conversion of raw materials into finished goods, and so on. If an expense cannot be sub-divided into two or more distinct types of expense, it is called a 'primary' expense.

The items such as wages, salaries, national insurance, rent, rates, raw materials, postages, telephone services and electricity purchased, - to mention only a few, - are 'primary' expenses, and if expenditure is tabulated in this manner, the resulting statement is said to be in

subjective form. Under this method, the expenses are listed according to the nature of the expenditure. The term 'natural' expense is also used to denote wages, salaries, rent, rates and so on.

If the expenditure is grouped according to the object for which it is made, the resulting accounting statement is said to be in objective form, and the entries in the statement will show the cost of carrying on the various activities in a business. It is no great step to suggest that the statement in objective form is substantially what is at present termed the cost accounts. On the other hand, the statement in subjective form is by no means identical with what is at present popularly known as the financial accounts of the business. There are, however, reasons for thinking that the so called financial accounts represent no more than an embryonic attempt to prepare a form of cost accounts. For example, one frequently finds what is called a trading account, designed to show the difference between the amounts paid for goods and value received on sale. These figures may be analysed to show the gross profit on different types of product. In addition, in the overhead expenditure section of the profit and loss account, there often appear headings such as transport and canteen. These headings attempt to show the cost of some activity in the business; they are not split into the different types of primary expense such as wages, salaries, materials etc., but they are aggregated because someone has thought the cost of carrying out that activity would be of interest to the management. If therefore, the cost of certain activities are

shown, why should not all the activities of a business be shown on a consistent basis ? The preparation of two statements with similar objectives is an unnecessary burden which can be eliminated if once the true structure of accounting statements is recognised. Accordingly, if the present so-called financial accounts are only an imperfect attempt at costing, we must substitute something more logical in their place.

Here we return to what was termed the 'subjective' form of accounts, in which expenditure is classified according to the nature of the payments made: wages, salaries, and so on. Such a statement will show the amounts of each kind of primary expense incurred in operating the concern. It is assumed, of course, that adjustments have been made for stocks, for accrued charges and prepaid expenditure.

It is suggested that this subjective form of accounting statement is, in fact, the true form of financial accounts, showing as it does the nature of the expenditure. Acceptance of this point of view would give some logical meaning to the present artificial distinction between financial and cost accounts.

The correct definition of each kind of 'primary' or 'natural' expense and the true distinction between financial and cost accounts will form the main burden of the part of this thesis dealing with the application of taxonomic principles to accounting.

In the chapters which follow, we shall deal with the principles of classification, the various arrangements of symbols (codes), and finally their use in accounting operations.

CHAPTER TWO.

CLASSIFICATION.

021. Definitions.

The definition of Classification given by T.H. Huxley, J.S. Jevons and L.S. Jast reads as follows :-

> "By the classification of any series of objects is meant the actual or ideal arrangement together of those which are like and the separation of those which are unlike; the purpose of this arrangement being, primarily, to facilitate the operations of the mind in clearly conceiving and retaining in the memory the characters of the objects in question, and the recording of them that they may be conveniently and quickly referred to; and secondarily, to disclose the correlations or laws of union of properties and circumstances." [1]

It is questionable whether any arrangement can be said to be ideal in the sense of being perfect for all purposes and at all times and the definition does not make it clear that more than one operation has to be carried out in classifying a series of objects. The process proceeds stage by stage, selecting one attribute at a time until all the attributes are exhausted or until the process of division into ever smaller groups has reached a stage which satisfies the practical requirements of the classifier.

The final part of the definition quoted is important: to reveal the relationship between various attributes inherent in the range of taxa under observation.

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1. Quoted by W.C. Berwick Sayers, "A Manual of Classification." (London, Grafton & Co. 1944) p.7.

The term Classification may also be used to indicate a number of items which have been classified and listed in the sequence prescribed by the classifying process.

Once a number of objects has been classified in a systematic manner so that those items with similar attributes have been brought into contiguity, it is then desirable to apply symbols to the items forming the Classification. Symbolisation may be described as the process of applying a symbol to each item in a Classification so that the item can be identified and referred to rapidly by the use of the symbol, which in a majority of cases will be a numerical one.

Strictly speaking, it would be possible to apply a symbol to every one in a list of classified objects, but the symbols themselves might be arbitrarily selected from figures, letters of the English or other alphabet, and shapes, such as triangles, circles, and so on. It is, therefore, desirable that the symbols should have some systematic or generally accepted sequence, such as consecutive numbers or letters of the English alphabet. There may be no particular logic in the sequence of our alphabet, but it is an order recognised from the earliest days of our youth.

Symbolisation may now be defined as the process of applying a series of symbols to a classified list of items, the symbols themselves following some recognised sequence.

Coding may be defined as the act of referring any item to the classification in which it lies, ascertaining the position of the item in the classification and ascribing to the item the symbols already assigned to the position occupied by the item in the whole classification.

A code may be defined as a system of symbolic representation of items of information designed to facilitate the transmission of such information between people familiar with the system; for example, the morse code.

Secondly, it is convenient to refer to a list of classified items and the relative symbols as a code. Such a list gives all the items in classified sequence in narrative form along with the abbreviated symbols at the side of each item so that anyone familiar with the scheme can find the appropriate symbol for any item, or if only the symbol is known, one can ascertain the 'en clair' statement of the information.

Thirdly, the symbols relating to a particular item may be referred to as the code number of the item, or simply "the code".

A code conveys information accurately, concisely, and in such a manner that it can be readily understood instantaneously, or by reference to a systematically arranged list of the items coded.

022. Theory of Classification.

What has been described as "probably the most useful logical treatment of classification" is included in "The Principles of Science"

by William Stanley Jevons (1835 to 1882). The full definition of classification in which Jevons had a part has already been quoted and as Jevons states elsewhere:

> "Science is the detection of identity, and classification is the placing together, either in thought or in actual proximity of space, those objects between which identity has been detected." [1]

By classification we mean the process of arranging objects into groups or classes according to their degrees of likeness. The important point is the degree of likeness between different objects: as Jevons has expressed it :- "Of every class so far as it is correctly formed, the principle of substitution is true, and whatever we know of one object in a class we know of the other objects, so far as identity has been detected between them." What we are trying to do is to discover the connections which exist between the attributes of the objects we are examining.

It is possible to state the theory of classification in symbolic form and following the illustration given by Jevons,[2] consider the arrangement of four objects which have attributes ABC, represented by ABC, AbC, aBc, abc. And let us suppose that the four objects are grouped thus :-

Group One.	Group Two.
ABC	AbC
aBc	abc

No special correlations exist in the above arrangement, although we may say that group one contains the quality B, whereas group two

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1. W.S. Jevons, "The Principles of Science" (London, MacMillan 1877) pp. 673-674
2. -do- -do- -do- p. 692

contains the quality b.

Let us now consider a revised arrangement :-

Group One.	Group Two.
ABC	aBc
AbC	abc

It is now seen that where the quality A is to be found in a group so also does one find the quality C, but the attribute B is indifferently included or excluded. It is said that the attributes A and C are correlated because the presence of one implies the presence of the other.

It is frequently possible to arrange a series of objects in a variety of ways, each of which may be valuable for a particular purpose, but in general we select the arrangement which is most convenient and useful for the principal objective we have in view.

For example, garments might be classified according to the material from which they are made, or according to the sex of the wearer, subdividing these again for children and adults. A third method could be in accordance with price ranges.

Methods of grouping taxa include the following :-

1. Analytical. This is the detection of relationships by analysis proceeding from the more complex to the simpler forms. This type of classification is frequently found in industry and commerce.
2. Synthetic. This represents the detection of relationships by synthesis, proceeding from the simpler to the more complex

forms, and this process is naturally the antithesis of the analytical method of classification.

3. Geographical. This type relates to the position of an object in space. This method of classification is of significance in the consideration of stock-rooms and work places (Cost Centres).

4. Chronological. This is classification according to position in time, and many business activities are, of course, grouped in date order.

5. Genetic. This type of classification is according to likeness in source or race.

6. Historical. This method combines the third, fourth and fifth methods of classifying objects.

7. Dynamic. This method follows the order of power, but is distinct from the Genetic classification which refers to likeness in source or race.

023. Principles of Classification : Terminology.

The chief rules to be observed under the heading of terminology are the following :-

1. To identify and isolate each item specifically from all others, it is essential to adopt a uniform method of describing the items, whether they be raw materials, finished goods, names of departments, expense accounts, et cetera. Each of these standardised descriptions is called a 'Term'.

2. A term should be as short as is consistent with clarity. If the terms are long and cumbersome, uniformity may be lost through employees using abbreviations, initials, corruptions or nicknames in place of the term.

3. Terms should be non-ambiguous.

4. Each term should describe the related item and not merely give it an arbitrary designation. Terms should be easily understood; that is, descriptive.

5. Each term should be used universally throughout the organisation; that is, there should not be two or more descriptions for any item. Conversely, each term should relate to one item only.

6. Other things being equal, a term should be in common use by those for whose advantage the system is devised. For example, if a certain article is referred to variously as a trolley, truck or bogie, then the term in most frequent use should be adopted, unless there are good reasons to the contrary. Alternatively, the shortest term should be used.

7. It should be possible to understand the meaning of a term by an examination of the further sub-groups into which the term is sub-divided by the classification.

8. The description given to an item should take into account the various inferior groups and sub-groups which fall within the meaning of the term.

9. Terms should be non-critical. For example, in a classification of human beings, it would be unwise to divide mankind into "white races" and "inferior races". The point may not arise frequently in business classification, but should there be a department in which much scrap arises because of technical imperfections in the process, it would be deemed critical for it to be described as the "junk department". Likewise it would be unwise for casual labourers to be described in the classification as "odds and ends".

024. Principles of Classification : Attributes.

1. An attribute may be defined as some significant feature which enables the members of a group to be divided into a number of sub-groups of the same relative importance. For example, a number of coats can be divided into sub-groups according to their size.

2. Each attribute should be relevant to the purpose in view. For example, there would presumably be no advantage in classifying men's coats according to the number of buttons on each one.

3. Each attribute should enable two or more sub-groups to be formed. For example, in a range of tweed coats, the attribute of being textile does not enable one coat to be distinguished from another. Similarly, the number of legs possessed by sheep would not be of

great assistance in classifying sheep. In other words, the attribute must not be possessed by all the members of the group. This state is not unknown in some factory coding systems, where, for example, a common prefix may be used to indicate the particular factory, even though the items comprising the scheme are never used anywhere else but in that factory.

4. The attribute should be capable of definition.

5. The attribute must be definitely ascertainable. For example, it is useless trying to sort a number of washers into groups according to their thickness in millimetres if there is no measuring instrument available which will measure in millimetres to the required degree of precision.

6. The attribute should be unchangeable so long as the purpose of the classification remains the same. If articles are classified according to function rather than by nature, it may happen that their use changes, in which case the attribute by which they have been classified would not be of a permanent nature.

7. The attribute should be arranged in sequence of importance for the purposes of the classification. For example, some men's coats and some men's socks may be brown, but there would be little point in making the first stage in classifying men's clothes according to colour, although at a later stage, it might be decided to sub-divide socks of each size according to their colour.

8. The attribute should be used consistently throughout the process of classifying. For example, if houses were being classified according to the number of rooms in use as bedrooms, it would be wrong to decide during the course of the survey that rooms should be included which could be used as bedrooms but which were in fact being used as additional reception rooms or playrooms. It will be noticed that before classifying houses according to the number of bedrooms, the term "bedroom" must be defined. For example, is it intended that bed-sitting rooms should come within the definition ? Moreover, would one say that a room which contained a bed-settee should be classed as a bedroom because on occasion people spent a night in the room ?

9. In general, it may be noted that attributes are best when they are clear, crisp and 'discrete'. They are bad when they depend on fine differences of measurement, or when it is difficult to record the feature without considerable investigation.

025. Principles of Classification : Division.

There are certain rules to be observed when dividing a large mass of taxonomic units successively into groups, sub-groups, sections, and sub-sections. These may be stated as follows :-

1. That the members of a group can be sub-divided by only one attribute at each stage.

2. That sub-groups of the same order, rank and importance should be mutually exclusive. Such groups may be referred to as co-ordinate classes. This means that it should not be possible to assign an item to more than one sub-group in an array, the latter being defined as a number of sub-groups of equal importance, all forming part of a larger group which contains them all.

For example, the terms 'farm machinery' and 'track-driven vehicles' are not mutually exclusive, because a farm tractor could be assigned equally well to either sub-group.

3. That the co-ordinate classes must provide a resting place for every item in the group being classified. That is, the sub-groups must exhaust the range of items. In some cases, this will mean providing a sub-group to hold items 'not otherwise classified'. In accounting terminology, the sub-group would be called 'sundries'.

In addition, however, the scheme of classification should make it easy to introduce new items without distorting the scheme. That is to say, when the classification is first made, consideration should be given to the possibility of new items arising in the future, although this is not so important for the classification itself as for the notation used to symbolise each item.

4. That the method of division should be determined by the purpose which the classification is to serve. This applies equally as in the case of attributes. For example, in the buyer's department of a departmental store, the work may be divided into sections according

to the sources of supply of the articles bought. One buyer may therefore procure garments for both men and women. A second buyer may be concerned with shoes for both sexes. But when the goods come to be displayed, it is possible that the classification for sales purposes will not be according to type of apparel but rather according to the wearer's sex. That is to say, all garments and shoes for men will be in a men's department. The method of division is therefore according to the purpose it is to serve.

5. That the arrangement of the sub-groups comprising an array should be in some natural or logical order whenever possible. For example, drills of ascending sizes A, B, C, D, should not be listed in sub-groups in the sequence B, D, C, A, or in fact in any other order than A, B, C, D.

6. That when sub-groups are divided into smaller sections of the original major group, the items within such sections should be arranged on a similar basis whenever possible. For example, if bolts are first classified by type of bolt, and then according to diameter, the sizes of diameter used for one type should be used for the other types too. In general, one may say that throughout any one code and throughout all codes in an organisation, there should be a constant attempt to find points of similarity; to use such similarities when establishing each scheme, and to employ the same notation to symbolise these similarities. The intention is to

emphasise basic unities and so to reduce the number of varieties which have to be comprehended and used in a business. The aim is simplicity.

7. That the process of division should proceed from the most general to the most detailed aspects of the items in the group. For example, one would not classify a number of bolts according to their diameter, and then, having done so, analyse them by length, next by type of material and lastly by type. The reverse procedure would probably be the case, although the first stage of division might be by type of material.

8. That the process of division should take place by gradual stages, as Milward expresses it, "each step must be proximate ---- no step omitted; step following step in due sequence".[1] This can perhaps be illustrated by Gilbreth's requirement that tools that are alike should be placed together, and should be adjacent to those which differ by one variable only.

9. That the process of division should not be carried beyond a length where the additional information provided can be used for practical purposes. In business, information should be adequate but not merely interesting.

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1. G.W. Milward, "Skill & Management". (London, MacDonald & Evans, 1947). p. 46.

10. That a chain of sub-groups, sections and sub-sections should include one representative of each feature used as an attribute. For example, if bolts are classified by type, material, length and diameter, it would be insufficient merely to state that a bolt was type A, length 2", diameter $\frac{7}{8}$", because we have not specified the material of which it is made, this being one of the attributes used in making the classification.

CHAPTER THREE.

SYMBOLISATION.

031. General Observations.

In the opening chapter four categories of symbols were mentioned, these being :

1. Symbols other than numbers ~~of~~ or letters of the alphabet.
2. Letters of the alphabet.
3. Mixed alphabetical-numerical systems.
4. Purely numerical systems.

Symbols of the first category are not in great use in the field of accountancy, but the second and third types may be found in certain stores systems. As, however, they are not so easy to handle in practice and tend to increase the number of errors in transcription, they should be avoided, particularly the hybrid type. The straightforward numerical method is to be preferred for accountancy purposes, especially where advantage can be taken of bookkeeping machines, whether of the key-driven or punched card variety.

032. Principles of Symbolisation.

1. It is desirable that the symbolisation should be 'pure'; that is to say, it should consist of figures or letters, but not of both. For example, identity card numbers include the following mixed symbols: Y E P H : 7 2 2 6 1 4 .
Whenever possible a pure numerical system should be used.

2. If the length of a symbol varies, then the more general subjects should be denoted by fewer symbols. For example, in the Universal Decimal Classification, the general concept of Accountancy is denoted by 657, whereas for the more detailed subject of depreciation the symbol is 657.372.3.

For card index and library purposes, a notation with a varying number of symbols may prove useful, but in bookkeeping it is a cardinal rule that all code numbers should be of equal length, as this makes it easy to see whether any symbols have been dropped in transcription.

3. It should be practicable to give appropriate symbols to new items without disturbing the existing numbers. For example, if numbers have been assigned in strict numerical sequence to a list of names placed in alphabetical order, then it is not possible to give a new name its proper numerical symbol in sequence unless the existing symbols are rearranged to make a space for the number of the new name.

4. Whenever possible, parts of the notation should be 'significant' which means that they should signify or state something about the item being coded. If a range of bolts runs from $\frac{3}{8}$" to 1" in diameter, this dimension can be symbolised by the figures 3 to 8, which indicates the number of eighths diameter in each case. If the range went above one inch, it would be necessary to use a two digit code in which the figure 8 could still be used for 1" diameter, 9 for $1\frac{1}{8}$", 10 for $1\frac{1}{4}$" et cetera. Alternatively, 1" would be denoted by 10, and so up to 17 for $1\frac{7}{8}$".

In some cases of difficulty, the decimal equivalents of fractions will solve the problem, though the resulting code numbers will not be quite so 'significant'.

Although it is valuable if the digits are significant, the code number should be kept as short as possible.

5. The notation should be mnemonic; that is, the figures or other symbols which stand for a discernible attribute should be the same in every part of the scheme where the attribute is represented, unless more important requirements are to be served.

6. The notation should be as brief as is consistent with efficiency in translating the term into symbols. It should be noted that the shortest notation is not always the most valuable, but other things being equal, the briefer the notation, the easier it is to memorise, while there will be less chance of errors arising in recording and transcription.

7. The notation should be simple; for example, all figures or all letters as mentioned in paragraph 1 of this section. On the other hand, long strings of numerals are unsightly, although it is the lack of brevity rather than the notation which is at fault in this case. So far as letters are concerned, even a pure notation of letters loses its simplicity when it exceeds three or four symbols.

In addition, a good notation should not involve the use of numerous points, strokes, colons, or brackets. The following are considered to be examples of bad notations :

Y6B9TC7

Y6/B:93.C7.

It may be observed that numerical notations employing six or seven digits are not uncommon in practice.

Under the heading of simplicity, one may also say that notations should be pleasing to regard, easy to speak, to memorise and to comprehend.

8. There should be no ambiguity. For example, if a mixed alphabetical-numerical system is ever used, the letters I and O are often omitted to prevent confusion with the figures 1 and 0. In addition Z may be omitted as it might be confused with a badly written 2, and for a similar reason Q may not be used because it may be confused with zero or the letter O.

In addition to the letters I, O, Q, and Z, the letter J is often eliminated when using alphabetical symbols.

9. The notation must be exhaustive, which means that it must be able to take in the full scope of the classification as it exists and also accommodate new items without difficulty. This attribute is known as 'hospitality'. Other terms which have been used include 'expansibility' and 'flexibility'. The first of these two terms could be applied to the Universal Decimal Classification because the symbols for any term could be expanded indefinitely by merely adding additional digits to the original number. It should be noted that this expansion takes place horizontally and is unlimited, but the symbol would become tediously long.

The term 'flexibility' does not seem the most apt, as it implies a process of bending, whereas a notation does not generally bend or change to suit the idiosyncrasies of new items. It may, however, be appropriate to say that a series of codes are flexible when they are so composed that sections of them can be abstracted and joined together or joined with one or two additional symbols so as to form codes for new purposes.

If it is permissible to say that a code is 'hospitable' then it means that new items will be received readily into the framework of the code and be given their appropriate symbol without dislocating other items in the code.

10. A code number should if possible reveal by its form the group and main sub-groups in which falls the item represented by the code number.

11. A code number should relate exclusively to one item and should isolate that item from all others in the scheme.

12. A code number should fulfil as many purposes as possible, but this does not mean that one code number can represent more than one item of the same type.

13. Although not often relevant to accounting work, it should be noted that it is useful to have a device for indicating modifications to an original or a standard type, such as changes in design of a component or a modification in the specification of the material from which it is made. This is a problem of some difficulty in practice.

14. On occasions, it may be helpful to have a sub-group at each level of the classification - or to use a certain key symbol - to indicate hybrid items which contain the attributes of two or more sub-groups. For example, it may be difficult to define what is meant by 'copper alloy', because even if the copper content is below 50%, it may still be treated in practice as a copper alloy.

15. The system should be adaptable to the demands of varying geographical or other local circumstances. For example, if a part of the code is 'significant' and shows a certain dimension in inches or fractions of an inch, this may not be suitable for use in countries where the decimal system of measurement is in use. Consideration

should also be given to this question when designing a finished goods code for sales catalogue purposes, because it may be found that the factory prefers to record its work-in-progress in terms of millimetres and centimetres rather than in fractions of an inch.

16. There should be some device for segregating items which can be grouped for a particular purpose, such as parts used for a particular sub-assembly. This rule is perhaps only a re-statement of the principle that the classification and symbolisation should be designed to suit the purpose in view.

17. In addition to the code number to indicate the type of item, it may be necessary to have a notation for assigning a number to each individual item or small batch of items. This may apply to car engines, wireless sets, certain camera lenses and other items, large in size or of appreciable value and where much skill has been exerted under controlled conditions.

18. Symbols representing special features should be readily recognised in the full code number. This is an extension to the more general idea of making the symbols mnemonic.

033. Administrative Features of Codes.

1. To allow of full and easy use being made of accounting and statistical machines, it is desirable that the notation adopted should employ the same number of symbols to describe each term. If all the symbols are of equal length then it can be called a 'closed' notation, to distinguish it from an 'expansible' notation such as that employed by the Universal Decimal Classification.

2. The code adopted should lend itself readily to statistical work. This is generally described as having 'statistical qualities'. What is desired is the ability to sort and tabulate quantities relating to terms having certain features. For example, if certain items contain copper, lead, zinc, or aluminium, it may be helpful if this fact is indicated clearly by the code symbols, which may incorporate a one or two-digit code for the purpose of indicating the type of metal involved.

3. For ease of use, it is desirable that the various codes should be inter-locked to the greatest possible extent. Another term which may be used to convey the same meaning is 'integrated'. Certain key numbers or parts of the raw material code may be used with the same meaning in the codes covering work-in-progress and finished goods. Again, the accounting code for analysing selling expenses should contain many features which are common also to the code for

analysing works expenses. To obtain integration, it is helpful if all the codes are compiled or reviewed at the same time.

These key numbers or sections of codes may be looked upon as letters of an alphabet, because they assist one to understand many codes, just as the letters of the alphabet enable one to understand - and to form - many words. Not to make use of key numbers is akin to devising a new alphabet every time one wishes to write a word. Naturally, the greater the number of common elements we can build in to our 'numerical' alphabet, the easier will it be to build and use the various codes. As examples of common key numbers, one will frequently find that in expense codes the figure 9 is used to cover items 'not otherwise classified', while zero is employed as a means of indicating a sub-total composed of the succeeding nine figures. For example, account 20 would represent the total expenditure falling under accounts 21 to 29 inclusive.

4. The notation should enable the code to accept new items and to accept changes in emphasis of the items classified over long periods without needing modification. A period of fifty years has been suggested in the case of one company which makes extensive use of codes. If a code is changed, staff need to learn the new code, while confusion may arise through the existence of two sets of symbols for the same article. For this and other reasons, once a classification has been made on logical principles, the notation should be so designed that it can remain unchanged for a very long time.

5. Although it has been suggested that codes should be integrated as much as possible, this is not synonymous with the mixing of two schemes of classification in one set of symbols. For example, accounting codes are frequently to be found in which various operations, or in other cases cost centres, appear under the same set of account numbers as primary expenses. It is usually better to have a separate code for operations unless they are few in number in which case they may form a sub-group of the group of accounts dealing with labour costs.

It is recommended that in addition to the list of expenses forming part of the accounts code, there should also be a list of cost centres which can be grouped into the departments forming the business. A cost centre is defined as the smallest accounting unit for which costs will be collected. It may be a physical location, an activity such as training, or merely a convenient resting place for certain primary expenses, not falling readily into any other cost centre.

Another cause of difficulty is the mixing of products and operations to indicate work done on certain products. Here again, it is considered better practice to have two separate codes, one for products and one for operations, because the constituent elements are then available for other purposes and the total number of 'letters' in the numerical alphabet is reduced. In addition, the use of separate codes for each element is an advantage when compiling statistics.

6. From an administrative point of view, it is helpful if a code can be used without an index, but this attribute may have to give way in the face of greater advantages possessed by types of code which are not self-indexing.

A list of names arranged in alphabetical order with concomitant numbers is self-indexing, and the same may almost be claimed for what is known as a chain code, a description of which will be given later.

7. It is also desirable for branch offices to be able to assign the correct code number to new items without having to consult their head office, but it is difficult in most cases to achieve this particular objective.

8. While the code must be hospitable to new items over an extended period of time, the 'utilisation' of the existing range of symbols should not be so low that the code symbols are unnecessarily long. By utilisation is meant the ratio of existing items to the total number of terms which can be accommodated by the notation. For example, if there is a two-digit numerical code from 00 to 99, and if sixty items have been assigned places in the framework, then we would say that there was a 60% utilisation of the notation. On the other hand, if there were only five items coded in the range 00 to 99, the utilisation factor would be 5% which in most cases would seem to leave overmuch room for expansion. Using the hospitality

metaphor, one would agree that a hotel which had a hundred bedrooms ready for use, but which never used more than five, was carrying unnecessarily high standing charges. So it is with code numbers: a code symbol which is longer than it need be merely increases the overheads of a business. This can result in waste of an appreciable degree, when one considers the multitude of times that reference symbols are written and typed daily in every business on job tickets, stores requisitions, sales invoices and so on.

As a guide, it may be assumed that where the utilisation factor is under 20%, there is a prima facie case for reducing the number of symbols.

There are therefore two conflicting principles, one of which implies a lengthy notation to achieve a long life for the code, and the other demands a short notation to minimise clerical work.

The conception of a utilisation factor has been evolved by the writer for use in investigating existing schemes and for considering whether new schemes are likely to remain hospitable for a sufficiently long period. It is tempting to imagine that experience may enable one to establish ratios whereby, if the present utilisation were stated, one could predict the useful life of the code before dislocation arose. By dislocation is meant the need to give such symbols to a new item as result in its being placed out of its correct sequence in the classification.

Clearly, the useful life of a notation will depend on a variety of factors such as the type of item being coded. For instance,

there may well be a substantial increase in the variety and types of consumable stores carried, especially in an expanding business. On the other hand, if the accounting code has been laid out with forethought, it is possible that it will last for thirty or forty years without need of change, even if the present utilisation factor is as high as 80%.

If the business has been established for a long period, then the range of indirect supplies may already be extensive and there is a better chance of a long life for the code than with a newly started or expanding company. As against this, a prosperous firm may decide to embark on new products which may upset an existing product code. Accordingly, many factors have to be weighed up when the code is being established.

When checking the utilisation factor, regard must be had to each sub-group and indeed to the lowest level of division, for it is here that dislocation is most likely to arise in the first place.

The utilisation factor is mainly a device for assessing what already exists or what has been proposed: it does not tell one how to sub-divide groups of taxa so as to diminish the possibility of dislocation and thus facilitate a long life for the code. This process may best be assisted by reviewing the number of items of a like nature and assigning more sub-groups and sections of the code where the weight of taxa is most prominent.

9. It is desirable that there should be an index to the items included under each code. The index should not be used as a means of assigning places and symbols to new items, which should be done by careful reference to the classification itself.

10. The series of symbols representing a classification should be so arranged that the degree of division of the classification can be readily contracted or expanded. Moreover, at each stage of expansion or contraction, the notation should enable statistics to be readily prepared with respect to the attribute represented up to the stage of division shown. If a series of taxa are numbered serially from 1 to 567 inclusive, systematic contraction may not be possible; but if these items can be grouped according to eight types numbered within ranges 000 - 099, 100 - 199, ... 700 - 799, then it will be possible to contract the 567 taxa into not more than eight groups at any desired time.

11. The final rule for symbolisation stated that symbols representing special features should be readily recognised in the full code symbols. As a corollary to this rule, there should be schedules of the common sub-divisions. If there is a set of standard numbers to denote shape, colour, or diameter, then the code symbols and relevant attributes can be tabulated for ready reference. The greater the number of common sub-divisions, the more mnemonic will be the code.

12. The type of classification and notation should be adapted to the capacity of those who will have :

1) to read code symbols;

2) to transcribe code symbols;

3) to abstract or sort items by means of code symbols;

4) to use the classification to give code numbers to items.

In practice, the numbers and type of the essential attributes in the items to be coded will probably determine the nature and length of the symbolisation.

034. Length of Symbolisation.

In the consideration of the appropriate type of code for any particular purpose due regard must be had to the circumstances under which the code will be used, and probably the most important single factor in this connection is the length of the code number itself.

One investigator in this field has obtained certain tentative results which suggest the desirability of a triadic grouping of figures for referencing purposes. The preliminary results indicate that errors in transcription are minimised when the length of the code is three, six, or nine symbols.

In the experiment, the operators had to translate en clair information into coded form and write the answer on a document.

The percentage of errors for codes of various lengths were as follows :-

	Number of Digits.	Percentage Error.
1	3	1.5%
2	4	4.2
3	5	6.7
4	6	2.3
5	7	8.2
6	8	8.6
7	9	4.7%

When it is necessary to use six symbols, it is desirable to break the notation into two sets of three digits. It may be noted that the Universal Decimal Classification inserts a point after the third digit; for example, 657.261 : Mechanisation (of accounting work).

It is still more necessary to break up codes with more than six symbols. It has been recorded that in an experiment a lecturer read out a list of nine figures which the audience were asked to write down. Only three or four correct answers were given. In a second experiment another set of nine figures was spoken in groups of three and almost everyone in the audience provided the correct answer.

The principle factor determining the number of symbols used will naturally be the number of taxa in the population to be coded. In addition, the length of the notation will be influenced by the number of relevant attributes possessed by the taxa as well as by the degree of division necessary to achieve the purposes for which the code is established.

CHAPTER FOUR.

NUMERICAL SYMBOLISATION.

041. Types of Numerical Symbolisation.

Five types of numerical code can be distinguished, and each of these will be examined in turn. They are:

1). Serial numbers.

2). Block code. a) Product block code

b) Class block code

3). Progressive Code with:

a) Serial suffix, non-classified

b) Serial suffix, classified.

4). Progressive Decimal Code

5). Chain Code

042. Serial Numbers.

1. Example: 1, 2, 3, 4, 5, ...

2. Brief Description: Each item is given a number, starting at 1 and rising as far as may be needed to accommodate all the items in question. New items are added at the end of the series as they come along.

3. Symbolisation: The symbolisation is pure, simple, brief, non-ambiguous and exhaustive. It is readily comprehensible until it extends beyond five digits. On the other hand, the

symbolisation is not mnemonic, nor is it significant.

4. Degree of Classification: Classification is absent from this type of code. It provides a mere "ordering" of the items.

5. Index Requirements: To locate any item in the code by name without perusing the whole sequence of numbers, it is necessary to have an alphabetical index.

6. Observations: This is perhaps the simplest of all code systems, and employs the minimum of symbols. It is easy to initiate, and can be expanded almost indefinitely. Outside a restricted range of purposes, it has serious defects. An item is merely "ordered" in time sequence and is not related in any logical manner to the items on either side of it.

One of the defects of serial numbering is that new items tend to be added without sufficient care being taken to ensure that a number does not already exist for the taxonomic unit being added to the code. This often results in one item having several reference numbers allotted to it throughout the code, with consequent multiplication of records and other disadvantages where the code relates to physical things, such as indirect materials.

043. Block Code.

1. Example: 001-099, 100-199, 200-299, ...

2. Brief Description: Under the Product Block Code, a group of numbers is allotted to each product manufactured, the intention being that all parts and assemblies relating to each product form one series of reference numbers. Under the Class Block Code, the blocks are assigned to particular types of sub-assemblies; for example, all electric motors would fall into the one group.

3. Symbolisation: The symbolisation is pure, simple, comparatively brief, and non-ambiguous. Care must be taken in assigning the blocks to ensure that all present taxa can be included in the selected blocks and that accommodation can be provided for new items in the appropriate section of the code. The symbolisation is not significant, but to a limited degree it becomes mnemonic as regards the main blocks of numbers.

4. Degree of Classification: Classification is only carried to one degree of division, and in the case of the product block code there may well be duplication of items between different blocks forming the code.

5. Index Requirements: As there may be hundreds of items in

either the product block or the class block type of code, it is essential to have an index in alphabetical order, both to locate the reference number of existing items and to assist in preventing a second reference number being used for a taxon to which a place has already been assigned in the scheme.

6. Observations: If the products made embody many items of a similar nature, then the product block type of code is not to be recommended as it leads to duplication, and so far as store-holdings are concerned, the sequence of code numbers is not in accordance with practice, because differences of size, shape, and general needs prevent the contiguous stocking of the related parts of a product. In other words, the allocation of code numbers on a functional basis is not generally desirable.

As regards the class block type of code, the main danger is that future developments may not have been correctly anticipated, with the result that certain blocks fill up too rapidly. It then happens that subsequent items can not be assigned to the correct block, and have to be inserted haphazardly within blocks relating to a different type of item. The whole basis of the system is undermined and becomes

unreliable when preparing statistics relating to the particular class of item originally assigned to each block. Moreover, the possibility of duplication is increased, especially if an index has not been provided.

044. Progressive Codes.

a). With serial suffix, non-classified.

b). With classified serial suffix

1. Example: 001-001 ..... 999-999.

2. Brief Description: A progressive code is one in which each main group is divided into two or more sub-groups according to the rules of classification, and sub-groups are treated in similar manner until the required degree of division has been reached. It may therefore be said that a progressive code is one which embodies two or more stages of classification.

The number of symbols will vary according to the number of taxa in the classification, and both the progressive section of the code and the suffix may contain more or less digits than the six figures shown in the example. In any one system, however, there will always be a uniform number of digits.

The suffix may be identical in construction and features to the serial numbers code first described, and carries with

it the attendant advantages and disadvantages. It is, however, preferable to classify and list the taxa falling into each sector of the suffix and then to assign numbers which allow of new items being inserted in their correct sequence.

3. Symbolisation: The symbolisation is pure, simple, and non-ambiguous. It will be longer than with the serial number type of code, but is kept within reasonable proportions by the use of the serial number suffix added to the progressive section of the code. The symbolisation is not generally significant, but the progressive part of the code quickly assumes mnemonic qualities.

4. Degree of Classification: The progressive types of code incorporate a greater degree of classification than any of the types hitherto considered, and because of this the progressive code has substantial advantages over the preceding methods. The taxa may be partially or wholly classified, though the serial number suffix is not mnemonic.

5. Index Requirements: An alphabetical index is helpful but a well presented guide to the construction and use of the code should enable it to be used without an index. If the scheme has been carefully arranged, there should not be an

extensive number of items falling within each portion of the classified progressive part of the code, and accordingly an index is not quite so vital a requirement as with the other types of code already considered.

6. Observations: The progressive types of code are probably the most useful methods of symbolisation for practical purposes when dealing with a substantial number of taxa of widely differing attributes.

045. Progressive Decimal Code.

1. Example: 001-009, 010-019, 020-029, ...
101-109, 110-119, ... 990-999.

2. Brief Description: In this type of code, the classification is carried to a logical conclusion; all the principal features of the items are classified and each group is divided into not more than ten sub-groups. The position of the various symbols is therefore fixed and full use can be made of mnemonic devices.

3. Symbolisation: The symbolisation is on a decimal basis, but with a uniform number of symbols. It is pure, simple, non-ambiguous and it can be to some extent significant, while the construction of the code enables it to be mnemonic to an appreciable degree. The symbolisation may be somewhat long, particularly if

there are many attributes to be classified. The length will also depend on the estimated influx of new items for which accommodation must be reserved.

4. Degree of Classification: The classification in this case is complete or virtually so for all practical purposes.

5. Index Requirements: After some experience of dealing with such codes an index becomes almost unnecessary, but if the notation is a very long one, and if new items are added at frequent intervals, an index will save time; it is recommended that one should be constructed. There should also be a well presented guide to the construction and use of the code.

6. Observations: The fully progressive code on a decimal basis is among the more useful types for business purposes, particularly where clerical methods are mechanised, and especially if punched card methods of accounting are in force. Because of the construction of the code, it becomes easy to interpret the code numbers without reference to the classification schedules, and full scope is allowed in the construction of schedules showing common sub-divisions.

At each stage of division, no more than ten sub-groups are available because of the decimal notation, so that great care and skill are needed in preparing the code. Meticulous

analysis is required of the items to be coded and there should be full consideration of the extent to which additions or changes in emphasis may arise in the future. For these reasons, the notation will probably be longer than in the case of Progressive Codes with serial suffixes. Nevertheless, the advantages of the decimal code are not lightly to be cast aside, and it is of great value for statistical and administrative reasons.

This method is very suitable for the coding of costing and other accounting activities, but where the range of attributes to be coded is great, it may be found that the length of appropriate decimal code is too great for practical purposes, and recourse must be had to the progressive code with serial suffix.

Q46. Chain Code.

1. Example: 253.12.71.49.

2. Brief Description: In this method, each feature to be classified is accorded a subordinate code of its own. For example, an article may be defined by length, height, width, colour, finish, quality and type of material. Minor code systems can be developed for each feature, and for any one article all the minor code numbers are strung together in a chain, being separated by points, obliques or dashes.

3. Symbolisation: The symbolisation in many parts will be significant, and in other parts mnemonic, which are perhaps the chief advantages of this type of code. Each subordinate code can be expanded without reference to the other parts of the symbolisation, so that the system can accommodate an unlimited number of items.

4. Degree of Classification: The degree of classification will be as great or greater than that found in any other method of coding and this brings all the advantages which arise from systematic and logical methods in any sphere.

5. Index Requirements: While an index is of some value with almost every type of coding scheme, it should not be needed when chain coding is in use, because the classification schedules consist virtually of a series of common sub-divisions. This is similar to the 'colon' system of symbolisation for book classifications invented by S.R. Ranganathan.

6. Observations: This type of code gives the classifier full scope for his ingenuity in making every minor code significant or mnemonic. Owing to the varying number of symbols the method is not the most suitable from a clerical point of view, but should any information be needed relative to any of the attributes which make up the code, the chain method enables it to be readily identified and abstracted.

The chain method will be of value whenever there are numerous attributes which it is essential for the code to reveal and when it is important that one should be able to read and interpret the symbols without reference to the classification schedules.

When it is desired to integrate one code with another, the separate parts of the chain code make it easy to transplant sections into other codes without alteration.

CHAPTER FIVE.

APPLICATION OF CLASSIFICATION AND CODING TO ACCOUNTING.

051. The Need for an Accounts Code.

A code was defined as a system of symbolic representation of items of information designed to facilitate the transmission of such information between people familiar with the system. It was further described as a list of classified items together with the relative symbols. An accounts code is a list of accounts, sorted into groups of a like nature, having symbols following a recognised sequence, and so designed as to assist the recording, transfer and summarisation of all the taxa involved, whether they be income, expenditure, assets or liabilities.

In any business of size the transactions are so numerous that a failure to classify them would result in an incomprehensible mass of data, valueless to management. It is essential to sort these taxa into homogeneous groups each of which conveys some relevant information about the business.

052. Advantages of a well designed Accounts Code.

An accounts code should be designed with the following objectives in view:-

1. To accelerate the coding of documents by having the symbols for

like items adjacent to each other or in the same group of the classification.

2. To assist in revealing errors in coding. Main sub-groups may be readily memorised and mis-coded items revealed almost immediately.

3. To provide more rapid compilation of short term statements. Accounts of a similar nature can be taken "en bloc".

4. To facilitate mechanical or manual book-keeping. Group sub-totals assist arithmetical control.

5. To facilitate control of expenditure. Expense accounts can be arranged in sub-groups broadly according to the way they fluctuate with changes in the volume of goods produced. It should be possible to establish norms of expense for given volumes of output.

6. To facilitate the abstracting of expenditure. The primary classification is by nature of expense: for example, wages, fuel, rent, stationery. The sub-group numbers remain the same, whether for production, factory services, distribution, sales department or administration. This assists in abstracting the total of any type of expense.

053. Construction and Symbolisation of an Accounts Code.

An accounts code will usually comprise four major groups, these being:-

1. Expenditure on production, distribution and administration, but not analysed in this way.

2. Sales and other income. There may also be included in this group non-trading income and expense, such as interest on investments. This point will be discussed later.

3. Assets.

4. Liabilities, including share capital accounts and reserves. In this group one may place "working accounts" such as that for holding tax deductions before transmission to the Inland Revenue.

The first group will be analysed into direct material, direct labour and other expenses. As a brief definition, we may say that direct material is that which enters into and forms part of the final product. Similarly, direct labour is that which is expended on manipulating, machining, processing or altering the material entering into the final product. These definitions are not comprehensive, but are considered adequate for present purposes.

The type of code recommended is a three-digit progressive decimal code, for although a two-digit code may be adequate in very small concerns, the three-digit code will fulfil the requirements of almost any organisation, however large.

This three-digit accounts code will not cover all possible varieties of direct materials, operations, products sold or capital assets utilised, but only the major groups or classes thereof.

The full range of taxa of such categories will claim separate codes of their own, not restricted to accounting purposes. The main groups and sub-groups of say, the direct materials code, should be arranged to fit into the first section of the accounts code, thus providing a certain degree of what is termed "integration"; that is, the incorporation in one code of certain symbols transplanted from another code.

It is generally preferable to have a separate code for operations, particularly where the number of types of operations is great and new operations might disrupt any code attempting to provide a separate account for every operation performed. In a few cases it may be possible, within the framework of the accounts code, to have a number for each operation, particularly where these are limited to classes of operation such as milling, planing and so on.

Sales analysis is frequently on an extensive scale and a separate product code is needed, the data for analysis being obtained from copies of the sales invoices.

The fourth category not detailed in the accounts code is plant and machinery for which there should be separate plant and machinery records, arranged according to an appropriate classification.

The accounts code should do no more than provide symbols for the main groups of direct materials, products and plant and machinery.

CHAPTER SIX.

THE NATURE OF PRIMARY EXPENSES.

061. Subjective and Objective Accounting Statements.

A primary expense is defined as one which cannot be divided into two or more distinct types of expenditure: that is, a primary expense account holds one type of expenditure only. A cost centre has been defined as the smallest accounting unit for which costs will be collected. As mentioned earlier, it may be a physical location, an activity such as training, or merely a convenient resting place for certain primary expenses, not falling readily into any other cost centre.

An accounting statement may be said to be in subjective form when the expenditure is listed according to the totals of each kind of primary expense, that is, according to what has been the 'subject' or nature of the expenditure such as wages, salaries, insurance, materials.

An accounting statement may be said to be in objective form when the expenditure is grouped according to the purpose or object for which the expenditure has been made; for example, steam raising, operation of transport, production of goods and services.

Thus we have a two-dimensional classification of expenditure, firstly according to primary expenses, and secondly according to the object or function. This is illustrated by the following table :-

Analysis of Expenditure .

1. Type of Expense: A, B, C, D, ...
2. Type of Activity: I, II, III, IV, ...

Type of Expense	Department						Total
	I	II	III	IV	V	etc.	
A							a
B							b
C							c
D							d
etc.							
Total							Grand Total

The cross totals, a, b, c, ... show the total of each type of expense (Subjective classification).

Vertical totals, 1, 2, 3, ... show the total of each kind of activity (Objective classification).

The cross-hatching under column III opposite item D represents the expenditure on expense type D in Department III. The Grand Total is, of course, the same whether for type of expense or type of activity.

062. Need for Two-Part Code.

Because of the desirability of preserving the distinction between primary and fuctional classifications of expense, it is necessary to have a two-part accounts code, the first part to classify the primary expenses, and the second part to classify the departments, cost centres, or activities for which the expenditure has taken place.

The types of department etc. making up the whole of an organisation vary widely from one industry to another, if not between concerns in the same industry, but primary expenses are very similar as between one business and another.

The failure to recognise the distinction between primary and fuctional expense accounts gives rise to much of the ambiguity inherent in present-day accounting statements.

063. The Nature of Primary Expenses.

A primary expense has been defined as one which cannot be divided into two or more distinct types of expenditure. For example, wages and payments for rent are primary expenses, but repairs are not, because repairs include indirect labour and indirect materials, each of which is a primary expense. Again, an account for the 'canteen' is not a primary expense, because it will include wages, food, crockery, heating, fuel for cooking and other

items. Expenses such as repairs and 'canteen' may be called 'composite' being composed of two or more prinary expenses.

064. The Categories of Primary Expenses.

Payments can be divided into nine categories :-

1. Payments to employees, - wages, salaries and the like.
2. Charges for materials and goods bought and consumed in the particular accounting period, or purchased in a previous period and now consumed.
3. Payments for outside services not elsewhere classified.
4. Charges for the use of facilities, including plant and machinery.
5. Payments for information and knowledge.
6. External payments for services of protection and to ensure the continuity and development of the business.
7. Ex gratia payments; for example, subscriptions to distress funds.
8. Payments for the use of purchasing power; that is, interest. Dividends paid to proprietors are not included.
9. Payments to support the social framework; for example, taxation.

For the production of finished goods during any one accounting period, the only payments necessary would seem to be payments to employees, materials, outside services, and charges for facilities. It should be noted, however, that certain employees may be engaged on

development work or on publicity matters.

The nine categories can now be summarised in the following manner :-

Categories.

1 - 4 Current production

5 - 7 External payments to assist continuity

8 Use of purchasing power: interest

9 Taxation in general

The fact that the Nine Categories would fit in to a decimal notation is fortuitous and this manner of grouping expenses is not necessarily the best method of classification for practical purposes.

065. Treatment of Repairs.

No mention of repairs has been made in the list of primary expenses because repair charges combine indirect wages and indirect materials. In addition, it is often the practice to load the labour cost of repair work with a percentage to cover the overhead expenses of the maintenance department or tool-room as the case may be.

While the variety and variations in scale of business enterprises make it unwise to generalise, there may be valid reasons in many cases for dispensing with the percentage addition in the amount charged for repairs.

It is always possible to cover the maintenance department expenses by an appropriate allocation as part of the general spread of factory

overheads. This may, in fact, be a fairer method because the maintenance staff are available at all times for work in any cost centre and not merely when breakdowns occur. They may be compared with a fire brigade whose services are available to every rate-payer. The cost of the service is recovered from all rate-payers (cost centres) by a charge included in the local rates. The overheads of the Fire Service are not spread only over those rate-payers who have been unfortunate enough to suffer fire losses.

Similarly, the overhead charges of a maintenance department may legitimately be spread over all cost centres which can call on their services as occasion may demand. This procedure will be satisfactory where the 'user' cost centres are likely on average to avail themselves to an equal degree of maintenance services over the period of a year or so, but where one or two cost centres, by reason of type or quantity of plant require more maintenance service than others, the allocation of total maintenance department overheads should be weighted accordingly.

If the allocation is made each month, it may be done on a pre-determined average usage basis, or it can be related to the number of hours or the labour cost of work done in each cost centre. The first method is probably the soundest.

Most allocation of overheads is to some extent arbitrary, and the elimination of the overhead percentage from individual repair charges will facilitate the work of accounting without sacrificing any great degree of accuracy.

The charge for repairs now resolves itself into three elements, labour, materials, and outside services by contractors. The third item may not be of great moment, but this will depend on the industry in question. Ignoring such outside charges for the time being, let us consider the proposition that repair accounts should be split into their component parts, the labour element finding its way into the section of the accounts code dealing with indirect labour, and materials used for repair purposes being charged into the indirect materials section of the accounts code.

Such a procedure has the advantage - in addition to speed of operation - of letting a foreman see the charge for time separately from the cost of materials used on repair work in his department.

It is not unusual to find extensive lists of repair accounts in the code used in particular factories, and while this may be essential in some cases it is thought that many of the accounts represent a duplication due to no other cause than variations in terminology. In this connection it must be remembered that we are considering a two-part accounting code in which the second portion consists of a list of cost centres. This means that it is generally unnecessary to specify the particular type of plant or machinery because this will automatically be indicated by the cost centre number.

Repair work may be related to main groups of capital assets as follows :-

Land	Plant and Machinery
Buildings	Vehicles
Roads, Sidings, Wharves etc.	Fixtures, Fittings and Furniture

Almost every type of repair can be fitted into one of these headings. Vehicles could logically be included under plant and machinery but as they are short-lived assets normally used outside the factory it is usually convenient to provide a separate account for them.

If within one cost centre there are two or more types of plant for which it is desired to have maintenance costs, separate accounts can be opened but even here it is possible if the need arises to use one account number to represent different types of machinery in separate cost centres. However, this should be avoided if possible.

We can now say that to meet labour charges on repair work a sub-group of ten accounts is needed in the indirect labour section of the accounts code, and for materials there will be a similar number of accounts needed in the section of the code dealing with indirect materials.

If it be felt that there is insufficient analysis of repair charges, it should be stated that the preparation of monthly or four-weekly operating statements is assumed and this means that the charges for repairs in any one cost centre can be analysed to one month's figures. At the same time, the number of accounts available in the Indirect Labour section to cover expenditure on repairs is not insignificant as shown by Appendix I. If necessary approximately thirty individual accounts can be used for analysing such expenditure.

CHAPTER SEVEN.

DESCRIPTION OF THE NINE CATEGORIES.

071. Payments to and for Employees.

Payments to own employees include amounts paid weekly, monthly and at other intervals, including bonus and co-partnership payments. This category also embraces contributions by the employer to pension funds and ex gratia payments to employees. The employment of labour brings with it compulsory payments by the employer of part of the national insurance contribution for each employee. The amount of this charge varies with the number of employees and so finds a place in Category One, but the charge might also be considered as falling into Category Nine covering taxation. For normal purposes it is proposed that it should form part of the cost of employing labour.

072. Charges for Materials.

For the classification of expenses by nature, it does not matter whether material is bought for stock and issued to production later, or whether the material is purchased and consumed in a single accounting period. This category will include everything which falls under the general heading of Direct and Indirect Materials, including stationery and office supplies. Fuel will be placed in this category,

as will the cost of purchased electricity and water.

073. Payments for Outside Services (not elsewhere classified)

Outside services cover a heterogeneous collection of items, such as the following :-

1. Carriage Inwards: This is usually added to the cost of the goods purchased.

2. Demurrage: If related to purchases, it may be included as a charge against the purchasing department, but if it relates to goods sold, it would form a part of the sales and distribution costs.

3. Carriage Outwards: This can be considered as a reduction in the amount received for the goods sold and included in the sales and distribution department expenditure.

4. Services received in respect of laundry work, window cleaning, disinfecting of telephones; vermin destruction; and other miscellaneous services by outside firms.

5. Communications: Telephones (internal and external), telegrams; postages; teleprinter charges.

6. Personal services received by own employees: These may include Hotel expenses, rail fares, steamer and other forms of travel, including transport of employees if paid by the firm to an outside contractor; also gratuities, but not entertainment of customers.

7. Charges relating to money: charges by banks for receiving, safe-guarding and issuing money; charges for use of night safe facilities.

8. Other Outside Services not elsewhere specified: for example, payments to a contractor for removing refuse; clearing ground; providing a lubrication service; repair work done by a contractor.

074. Charges for the Use of Facilities.

The cost of providing accommodation, machinery and plant must be paid, either period by period, or by a large initial outlay later charged against production over the useful life of the plant. This heading will include the following :-

1. Depreciation and obsolescence of machinery.
2. Charges for hiring machinery and plant, including office machinery, time clocks.
3. Rent of buildings and ground.
4. Payments to employees for use of their cars, cycles, tools.

075. Payments for Information and Knowledge.

Information and knowledge may be purchased in a variety of ways :-

1. Professional subscriptions for employees covering journals, and other literature; information from technical bureaux; this heading may also be taken to include conference fees.
2. Trade Association subscriptions so far as they relate to the receipt of publications.
3. General purchases of journals, books and information services.
4. Royalties may come under this heading, if considered simply as an explanation of how to do something in a particular way; for example, use of a special type of machine.

076. External Payments for Protection, Continuity and Development.

Protection will include contributions to a trade association so far as it exists to protect the interests of members. Audit fees and expenses may be charged to this heading, if it is agreed that the auditors' function is to protect the business against defalcations by its own employees or fraud by any other party. Legal charges will often fall into this category.

Insurance is another form of protection, the effect being to spread the cost of losses over the community.

Under continuity and development one may add advertising and all forms of publicity, including the entertainment of customers. Included in this category are research and development fees paid to trade associations and other bodies, and the fees of consultants who may be advising on the improvement of any aspect of the business or on the general policy to ensure continued success. It should be noted that the salaries of the firm's own research staff fall into Category One. Patent Fees come under this heading as part of continuity and development.

077. Ex Gratia Payments.

For the sake of charity and to preserve the goodwill of the community, donations may be made to charities from which the business can expect no specific benefit. Subscriptions to hospitals in which employees may receive treatment should strictly be charged under outside services.

078. Payments for the Use of Purchasing Power.

To acquire the machinery and stocks to set up a business, it is essential to have the use of purchasing power, and the payment of interest is the cost of acquiring this purchasing power.

Where a business buys machinery on hire purchase the difference between the normal cash price and the total hire purchase payments would be charged to this category.

079. Payment of Taxes.

Taxes may be classified as private, local and national. Under the first heading one may have way-leaves, tithes, and the like. The main and perhaps sole item under local taxation will be rates. Under national taxation come the various taxes on profits earned and distributed, as well as customs and excise duty, and purchase tax; also national insurance contributions, if not included in Category One. There can also be included stamp duties on receipts and on cheques and documents, as well as vehicle and personal driving licences. If fines for traffic offences are paid for employees, they may be debited here.

The services of outside consultants engaged to settle the tax payable are part of the cost of these taxes to the individual business, because had taxes not existed there would have been no need for the services of the consultants.

CHAPTER EIGHT.

BUILD UP OF THE ACCOUNTS CODE.

081. Groups of Primary Expenses. 000 - 599.

The number of accounts allotted to each main group of primary expenses can be varied according to circumstances, but it is preferable that they should follow a common sequence. The following groups are illustrative.

000 - 099	Direct Materials
100 - 199	Direct Labour
200 - 299	Indirect Labour
300 - 399	Indirect Materials
400 - 499	Other Costs not elsewhere classified
500 - 599	Expenses of a Fixed Nature

082. Direct Materials and Direct Wages.

It is convenient to give a separate main group to direct material because this section of the accounts will then hold all the charges arising from one source of original entry, namely the summary of Direct Materials issued for the period. In addition, the first two stages of division of the direct materials code can be accommodated within the group 000 - 099 of the accounts code, and this integration facilitates the use of the numerical 'language'.

The nature of the industry will decide whether it is desirable to have a separate main group for direct labour or whether this type of expense may be merged with the following group and termed 'labour' in general. If a separate group is maintained, it allows considerable latitude in the analysis of labour, and if there is a separate operations code, the first two digits can be integrated with the accounts code.

Despite low utilisation, it may still be desirable for book-keeping purposes to maintain separate groups for direct material and direct labour.

The main groups of accounts move from variable to fixed expenses. The first group (direct materials) should vary almost directly with output, but the sixth group, (500 - 599) comprising insurance, rates, interest and other expenses, will generally remain static until there is a marked change in the volume of production.

083. Indirect Labour. 200 - 299.

Indirect labour is a wide term covering many occupations inside and outside the factory, but careful scrutiny will indicate that there are only a few distinct types of indirect labour in any one cost centre. The following items will cover the majority of cases.

General Indirect labour related to a particular cost centre.

General Indirect labour not related to a particular cost centre.

Supervision: e.g. Superintendents, foremen, chargehands.

Technical Staff (weekly paid) ; e.g. machine setters

Inspection Staff (weekly paid)

Clerical Staff (weekly paid)

It is essential to note that the three-digit code specifying account numbers is linked in all cases with a three-digit code dealing with cost centres, so that the first two types of indirect labour mentioned above are further defined by the associated cost centres.

In Appendix I it will be seen that the range of numbers assigned to indirect labour allows for forty-nine accounts, including five summarising accounts which may or may not be necessary according to circumstances.

When discussing repair work it was observed that there were six main types of repair charges and with the six types of indirect labour listed above there is a minimum of twelve accounts needed out of a range of forty-nine available numbers.

It may not be unusual to find two types of indirect labour within one cost centre as for example, boiler-men and general labourers in the steam raising cost centre. For this reason a standard number should be used whenever reference is made to the most characteristic type of indirect labour in each cost centre and likewise another standard number should be used for all general indirect labour. The latter can be placed in category nine, which is usually reserved for sundries or for taxa not elsewhere classified - and not thereby of less significance from a monetary point of view.

In some cases, it may be desired to segregate the cost of time spent on internal transport work. This may be another sub-division of indirect labour, although it may sometimes be covered by linking the work with a cost centre for internal transport.

The above arrangement is designed to show the periodic cost of indirect and maintenance labour in each cost centre and for most purposes this will be sufficient. In some cases, however, the cost of maintaining certain large pieces of plant or machinery may suggest a separate analysis linking the expense account with the number of the particular machine in the separate code for plant and machinery. This record would usually be separate from and additional to the normal record of indirect labour costs already described.

084. Indirect Material. 300 - 399.

Indirect materials will run parallel in many respects to the section of the code covering indirect labour costs, so that if account 232 relates to wages spent on repair of buildings, account 332 should if possible relate to indirect materials used for the same purpose.

In addition to charges emanating from the indirect materials summary, there may be charges for materials which have not passed through the store accounts, but these should be restricted to materials. Services by contractors fall into a later section of the code.

This main group will therefore be constructed on the following lines:-

301 - 329	General indirect materials
330 - 349	Maintenance materials
350 - 359	Water, Fuel, Light and Power if bought from outside.

It is desirable to preserve the link between the 200 group and the 300 group but if this should restrict the required analysis of indirect materials, the whole range from 301 to 399 can be used for indirect materials. There is, however, no virtue in multiplicity for its own sake.

085. General Charges 400 - 499.

The first four main groups (000 - 399) dealt with labour and materials used in creating the product or facilitating the operations of the business. That is, the charges were created internally in the business. The fifth group (400 - 499) is concerned with external payments for various goods and services.

Broadly speaking, this and the following group deal with charges which have not found their way into wage or material summaries.

086. Fixed Expenses 500 - 599.

The main group from 500 to 599 is reserved for those expenses the amount of which does not change greatly for appreciable variations in the level of output. Examples are insurance, local rates, interest and depreciation. Frequently the greater part of these charges will continue even if the plant is shut down.

Greater activity in the business will result in increased insurance charges for employers' liability, for fire insurance on stocks etc., and further payments if more cars are added to the transport fleet.

Local rates will not fluctuate greatly from one year to another in the majority of cases, but interest payable will show changes if the concern is being financed by bank overdrafts and if there is much of a swing between profits and losses. Interest charges on debentures will only change if some are redeemed or further debentures are issued.

Rent payable comes into this group and precedes the charges for depreciation: the one relates to the use of buildings and the other to the use of machines.

Taxation on profits has been placed in the 500 group in order that the primary expense section should provide exhaustively for all payments. It may well be argued that taxes on profits are not fixed from year to year and that they are allocations of profit rather than payments connected with the operation of the business. This would be a valid criticism and if desired such payments may be allotted a separate sub-group after the fixed expenses, say sub-group 590 - 599.

087. Composite Expense Accounts 600 - 649.

Because repairs are composed of two or more primary expenses, they were called composite expense accounts. Another type of composite expense arises, when one wishes to find the cost of a particular activity which is not considered sufficiently important to be assigned an individual cost centre number of its own. This type of composite expense may be thought of as a miniature cost centre and this being so any primary

expense may properly be charged to a composite expense account.

Theoretically, they are not expenses but functions and activities; but to avoid the proliferation of ledger accounts which would arise if a separate ledger card were prepared for every primary expense incurred in every function and activity, these so-called composite expenses are called into being. Activities which may be treated as composite expenses include: research; works offices; show-rooms; publicity; laboratory, if not included under research; training; canteen; welfare facilities; drawing office; fire prevention; civil defence.

These composite expense accounts are allotted a section of accounts in the six hundred group, say 600 - 649. In the cost centre code, the numbers 600 - 649 should not be used, so that any composite expense which increases in importance can be transferred from a given date to the cost centre code and thereafter have a full set of primary ledger accounts ~~cards~~ for the analysis of its charges.

A composite expense may also be considered simply as a cost centre for which the charges are all entered in one ledger account, instead of being expanded into a number of accounts for each primary expense arising in the cost centre. At the same time, a columnar account may be in use, thus allowing a certain amount of analysis by source of entry such as labour; materials; invoices; petty cash payments; journal entries and sundries. This preserves to a limited extent the distinction between the main groups of primary expenses.

In the cost ledger, the composite expense accounts will lie behind the primary expenses incurred in each cost centre, because the sequence of numbers given to composite expenses follows the exhaustive

provision for primary expenses in the range 000 to 599.

088. Inter-departmental Cost Transfers.

Included in the list of cost centres there will be ones such as transport, steam raising, electricity generation and so on. The value of the work done will be charged out to other cost centres, and so one must provide an account in these "user" cost centres to receive the transferred charges. The required series of accounts must not destroy the purity of the range of primary expense accounts, and so the numbers 650 to 659 are used to hold these debits.

The code of accounts has now reached the following stage:-

Primary Expenses	000 - 099	Direct Materials
	100 - 199	Direct labour
	200 - 299	Indirect labour and labour expenses
	300 - 399	Indirect materials
	400 - 499	General charges
	500 - 599	Fixed expenses
Composite Expenses	600 - 649	"Concentrated" cost centres
Cost Transfers	650 - 699	Charges transferred for transport, steam etc.

With regard to the 600 group of accounts, it may be found preferable to allocate rather more accounts to composite expenses than to cost transfers. Any change should not have the effect of splitting a ten-sub-group between the two types of account.

Some observations on the treatment of certain accounts are given in Appendix Four and the build up of expense in cost centres is described in Appendix Five.

089. Cost Centre Code.

Having dealt with the classification of expenditure it may be appropriate at this point to consider in a general way the classification of cost centres, - a cost centre being the smallest accounting unit for which costs will be collected. In a narrow sense the term refers to a small section of a factory in which a single process or operation is carried on: in the wider sense it connotes any section of activity the periodical cost of which is significant and worthy of ascertainment. This covers activities both inside and outside the factory, as well as general administration. A cost centre need not necessarily have a physical location, for it may relate to an activity such as education and training. Training may be carried on in a variety of places, and education may take place outside the factory walls.

Though the cost centre is, by definition, the smallest unit for accounting purposes, in any organisation of size there may be aggregations of cost centres - sometimes described as budget centres, - within the organisation as a whole. In this case, the cost centres must be under the control of one individual as any system of budgetary control must fit the organisation plan. If budgetary control is not in force, the term "section" or "department" may be used. For accounting purposes any number of cost centres or groups of cost centres can be brought

together to provide, say, the total cost of making a particular product or the total cost of manufacturing operations.

The main divisions of the cost centre code will be designed to segregate the costs of production, distribution and general administration. For this purpose a three-digit progressive decimal code will be convenient in an organisation of any size, although on occasion a two-digit code may be found adequate.

In the production division the manufacturing departments can be arranged in the following sequence:-

1. Departments dealing with the manufacture of parts such as the machine shops.
2. Departments relating to the putting together of parts and components bought from outside; that is, fitting and assembly departments.
3. Departments concerned with processes:-
   (a) those ancillary to the manufacture of parts, e.g. heat treatment.
   (b) those concerned with finishing - painting, spraying etc.

The manufacturing departments will be supported by numerous service departments. In most cases it will be necessary to have departments for Buying, Storing, and Transportation (internal and external). A second group is concerned with works services such as the drawing and treatment of water, steam raising, electricity generation, compressed air and industrial gases and minor processes such as solvent recovery needed to service the main manufacturing operations. Thirdly, there is often a substantial maintenance department and tool room. Fourthly, there is

a group concerned with the initiation of work and its flow through the factory; for example, the design and drawing office, methods, motion and time study, production planning and control, and inspection departments. There are also the factory administrative departments.

If the company distributes its own products, there may be a substantial distribution department, including fully-equipped garages and a fleet of transport. All these activities may be considered as coming under the headings of Finished Goods Warehouse, Packing and Delivery.

Another important series of departments relates to advertising and selling, these being sub-divided when necessary according to sales areas or products.

Finally, there are the general administrative departments: secretarial, financial, legal, direction.

Research and Development may stand on its own, or it may come under manufacture or distribution according to its importance relative to either.

A skeleton cost-centre code is given in Appendix Two. The same general principles should be used here as in the construction of the accounts code proper.

When considering the demarcation of cost centres, the following factors should be taken into account:-

1. Similarity of processes or operations
2. " " machinery
3. " " expenses incurred
4. Physical limits
5. Supervision
6. Information required
7. Value of information[1]

1. Maze and Glover, How to Analyse Costs. (New York, Ronald Press Co. 1929) p. 33.

Each main group will be sub-divided into eight or nine sub-groups, and this may often be found a sufficient analysis and thus the third digit of the code will end in zero. If further sub-division is needed in the future, any sub-group can be further divided into eight or nine cost centres. The first stage of division can be taken as resulting in a series of "departments" and this second stage provides "cost centres". In other cases, the main groups may be taken as departments where these are not numerous, and the sub-groups would then constitute "shops", with the second stage of division again providing "cost centres".

The 300 group covering Works Services may be taken as broadly analagous to the 300 group of the accounts code which deals with Indirect Materials. Into the cost centre code will fall Water Treatment, Steam Raising, Electricity Generation, Compressed Air etc., Solvent Recovery, Maintenance Department and Tool Room, and Pattern Making.

The 400 group of cost centres is to some extent similar in function to the 400 group of the accounts code which deals with General Charges. So the 400 group in the cost centre code deals with such general factory activities as the Goods Inwards Stores, Internal Transport, Design and Drawing Office, Methods, Motion and Time Study, Production Planning and Control, and Inspection Department.

The 500 group relates to activities which will not fluctuate greatly over considerable changes in volume of output and so this group may be thought of as similar to the 500 group in the accounts code covering Fixed Expenses. In the cost centre code we will find

such departments as the Buying Department, the Personnel Department, including Medical Service, Safety and Sanitation, the Works Office, including accounting and cost functions, and finally General Works Management.

The purpose of the Composite Expense Group will be discussed later.

The 700 and 800 Groups will vary largely according to the size and type of organisation in question, as will the 900 Group for General Administration of the entire concern. Although it has been suggested that Research and Development should fall into one of the main Factory or Sales Groups, there may be something to be said for placing such expenditure in the 900 Group, say department 980, because this type of expenditure may well be of a long term nature with little or no relation to the current level of output.

In Section 087 dealing with Composite Expense Accounts, it was explained that such accounts could be considered as cost centres for which all the charges were entered in one ledger account. If some such activity should assume greater importance, it can be designated as a cost centre in the Composite Expense Centre range. This means that from a given date an appropriate set of ledger accounts will be maintained, for so long as the activity justifies the additional analysis involved.

It may be thought that these composite expenses should be given numbers appropriate to their sequence in the manufacturing and selling operations. For example, some composite expense relating to the Finishing Shops might be given a number in the 200 group. Unfortunately, this would clash with such indirect labour and labour expense accounts as fell into the cost centre Group covering the Finishing Shops. Should there be accommodation at the relevant point of the cost centre code, an alternative treatment is to delete the activity from the composite expense section and instal it permanently as a fully authenticated cost centre.

The principle proposition here is that a composite expense account should be segregated from normal cost centres so long as the composite expense account remains in its chrysalis-like state.

CHAPTER NINE.

REVENUE, ASSETS AND LIABILITIES.

091. Sales and Cost of Sales.

Normally there will be a separate code for the products sold, and only the totals of the main groups or sub-groups of such classification need be incorporated in the accounts code itself. If there are no more than, say, thirty-five sub-groups in the sales code, they could be given consecutive numbers in the 700 group of the accounts code. Another thirty-five numbers would be reserved for the cost of the goods from which the revenue is derived. The remaining spaces in the 700 group would be used for miscellaneous receipts and non-trading revenue such as dividends on investments.

Assuming that there are a substantial number of items in the range of products sold, it is better to maintain a separate sales analysis and bring into the accounts code only the main groups of products. For example, if products A, B, C, D, E constitute main groups 1, 2, 4, 5 and 9, then such groups in the accounts code would be numbered 711, 712, 714, 715 and 719. Account 710 would be used as a summary account for all sales.

It is assumed that the expenses of manufacture are cleared into a finished goods stock account whenever goods are put into the warehouse. When any of these goods are despatched to a customer, the cost price will be credited to the finished goods stock account and debited to the "Cost of Sales" account.

In the above circumstances, the cost of sales accounts would be numbered 721, 722, 724, 725, and 729.

Within the 700 group it is necessary to find a place for discounts and other allowances granted to customers. These are thought to be in the nature of a reduction in revenue rather than an expense of the business, so that cash discounts granted, quantity rebates and such like would not be recorded among the primary expenses. In some cases, such rebates would be analysed into the same product groups as the sales and cost of sales, so as to reveal the final gross profit on each category of merchandise: in other cases only one account would be used for allowances and discounts.

Where it is the custom to grant, say, $2\frac{1}{2}\%$ cash discount for payment within one month, it seems more correct to credit sales account with only $97\frac{1}{2}\%$ of the full list price of the goods, because the business must be planned to make a profit on the assumption that every customer will take advantage of the cash discount allowable. The remaining $2\frac{1}{2}\%$ of the list price would be credited to a cash discount allowable account, to which would be debited the discount actually deducted by customers who paid within the prescribed time. The balance on this discount account would represent discount facilities not taken up by customers, and is a financial gain dependent on the liquid position of a firm's customers.

The 700 group now has the following appearance:-

Sub-group.

710 Sales at list price less cash discount allowable.

720 Cost of Sales (Cost price of goods sold).

730 Allowances granted to customers (excluding cash discount).

Supplementary analyses would be prepared as required according to the detailed product code.

092. Miscellaneous Receipts.

In almost every business, miscellaneous receipts arise such as dividends and interest on investments, rents receivable, receipts from scrap, cash discount on purchases of materials, and subsidies received. As these items are of a heterogeneous nature, it is proposed that accounts 750 to 799 should be reserved for insertion of individual items.

Non-trading expenses are covered by the primary expense section of the accounts code, but to gather such items together, a cost centre should be provided within the 900 Group of the Cost Centre code. Within this Group, the following cost centres can be used to collect the taxa in the 700 group of the accounts code:-

991 Cost Centre for sales accounts

992 " " " cost of sales accounts

993 " " " allowances granted to customers

995 " " " non-trading income.

It is further proposed that cost centre 996 should be used for revenue relating to prior years, and cost centre 997 for expenditure of a similar type.

093. Assets and Liabilities.

The two remaining groups of accounts cover assets and liabilities, in which the following broad divisions can be discerned:-

Assets

1. Cash and liquid funds, including bank balances; also trade and other investments.
2. Debtors and debit balances.
3. Stocks: raw materials, work-in-progress, finished goods, consumable stores, and maintenance materials.
4. Capital Assets (gross cost) analysed into the main groups included in the plant ledger.
5. Accumulated Depreciation (this is a credit balance).
6. Intangible Assets.

Liabilities

1. Creditors and credit balances, including "working accounts" such as the account for recording tax deductions before transmission to the Inland Revenue.
2. Reserves, including balance on Profit and Loss Account.
3. Share and Loan Capital.

The cash balances and financial claims on other parties fall into the first two categories of assets, while physical things fall into the third and fourth categories which deal with stocks, etc. and capital assets.

The classification of direct and indirect materials is a study in itself, but one which will well repay the time spent on it. The types of code most useful are the Progressive code with a serial suffix, classified or non-classified, and the Progressive Decimal Code.

If there is a separate code for capital assets, the first digit can be integrated with the accounts code, and the main groups of capital assets generally include the following:-
Land; Buildings; Roads, sidings, wharves etc; Plant and Machinery; Vehicles; Fixtures, fittings and furniture. To be in line with other sections of the accounts code, the numbers assigned should end in 1, 2, 3, 4, 5, and 8. If the 850 sub-group is used to hold the accumulated depreciation, (credit balances), the symbols will correspond with the 550 sub-group holding debits for depreciation in the list of primary expenses. The 860 sub-group can be used for the asset accounts themselves.

In the same way as the primary expenses are linked with cost centres, so may the capital assets be analysed according to the cost centres in which they are used. This will facilitate the charging of interest to departments and processes when desired.

If there is a separate detailed code for capital assets, one sub-group may be sufficient in the accounts code proper for the main groups of capital assets. In other cases, all the types of capital assets may be accommodated in the accounts code, in which case a range of twenty or thirty numbers can be used. The same number of accounts is needed to hold the accumulated depreciation, and this must be kept in mind so as to leave sufficient sub-groups for the other types of asset.

The range and variety of capital assets in use in different firms is great, so that each case must be examined on its own merits. Similar remarks apply to categories of debtors and debit balances, as also to stocks.

For the sake of good order, a cost centre in the 990 sub-group can be used for assets and another for liabilities so as to make the double entry analysis complete. In other words, the financial ledger can include accounts for main groups or sub-groups of primary expenses along with accounts for revenue (700 group) and assets and liabilities. Composite expenses and cost transfers will not appear in the financial ledger.

In the cost ledger, primary expenses will have been posted to the various primary accounts in each cost centre and to the composite expense accounts. To balance the cost ledger, cost transfers will be ignored, or if taken into account, only the uncharged balance on the transferring cost centres will be included.

The two ledgers can be suitably arranged so as to be self balancing, although forming a single integrated book-keeping system. Alternatively, the cost ledger may relate solely to expenditure, the sales and balance sheet items appearing only in the financial ledger. It is emphasised that the entries in these two ledgers come from the same set of original records: the financial ledger provides the subjective grouping of accounts and the cost ledger the functional.

We can now complete the accounts code as follows:-

Primary Expenses	000 - 599
Composite Expenses	600 - 649
Cost Transfers	650 - 699
Sales etc.	700 - 799
Assets	800 - 899
Liabilities	900 - 999

The arrangement of Balance Sheet items is discussed in Appendix Six and the following Appendix refers to the importance of preparing a comprehensive Manual of Accounts.

CHAPTER TEN.

THE FORM OF ACCOUNTING STATEMENTS.

101. The Development of Accounting Statements.

For the accounts prepared within a business, there are frequently found these statements:-

1. Manufacturing account.
2. Trading account.
3. Profit and loss account.
4. Appropriation account.

There is no uniform pattern for these statements so that in most cases accurate comparisons are not practicable.

The phrase "Profit and loss" is a curious one: it implies that there are both profits and losses in the same accounting period. Perhaps it is a relic of mediaeval times, when a merchant might enjoy profits on some voyages and suffer losses on others, all within the one accounting year. In this case his profit and loss account might appear as follows:-

Loss on voyage 1.	£10	Profit on voyage 2.	£20
" " " 3.	20	" " " 4.	30
Profit for year	30	" " " 5.	10
	£60		£60

Such an account is akin to a statement of profits and losses on products or departments of a business: it is a functional design equivalent to elementary costing.

A business which buys and sells goods can easily establish its gross profit, this being the difference between the value received for goods sold and their cost to the merchant. From this gross profit, the trader deducts his other outlays, expressed as primary expenses such as wages, salaries, rent et cetera, and he finds his profit. This is substantially a subjective form of statement.

When manufacture takes place, there is usually an attempt to split wages and other items between manufacture, distribution and in some cases administration. Not all the expenses are so treated, and a residue such as national insurance, pension contributions, and other primary expenses are frequently left in their crude form and not apportioned over the activities of the undertaking. The result is a heterogeneous grouping of figures constituting an elementary attempt to show the cost of different functions of the business. Such statements try to get the best of many worlds and do not follow universally prescribed principles in their construction. Without question, such forms of account have been and are useful: that is agreed. Nevertheless, they are the residuary legatees of mediaeval book-keeping. It is time to reconsider these matters.

102. Cost Accounts and Financial Accounts.

The failure in Great Britain to investigate these problems at an earlier date has led to the unfortunate schism between what are called the "Cost accounts" and the "Financial accounts." Only in comparatively recent years, and possibly as a result of the infiltration of American

ideas, is it becoming realised that the accounts are one and indivisible. They may be expressed in different ways but such expressions are merely alternative presentations of the same basic data.

If the term "Financial accounts" is ever to have a precise meaning, this term should be reserved solely for accounts prepared in subjective form, as these show the nature of the expenses on which money has been disbursed, so justifying the name.

The "Cost accounts" provide a statement of accounts in functional guise and may be called the objective form of accounts. Such accounts will show the results of each type of activity, with subsidiary statements analysing departmental accounts for each activity, all on functional lines, although in the more detailed statements, primary and composite expenses will appear, along with cost transfers.

If these proposals can win general agreement, it will stimulate a whole-hearted effort to achieve uniform principles in the preparation of the cost accounts, leaving the financial accounts to provide information on primary expenses not available at the present time from the general profit and loss account.

It is recommended that the records should be so classified and coded as readily to provide:-

1. A set of accounts on functional lines.
2. A brief statement on a subjective basis, showing the same net profit as the first set of accounts.

The cost accounts are essential for controlling expenditure, while the financial accounts will be found of use in determining the effect of changes in price levels and for purposes of economic analysis. In some cases, it is easier to control an expense in total than when it is spread over numerous cost centres. The information in this subjective form of accounts may also have a bearing on industrial relations.

103. Forms of Accounting Statements.

In addition to the forms of account already mentioned, there are others such as those related to the use of budgetary control and standard costs. Still further methods of presentation are illustrated in simplified form in Appendix Three. These forms of objective statement are alternatives, only one being necessary in general for use in conjunction with the subjective form of accounts.

The main points to be emphasised are these:-

1. The combination of two methods of presentation in one statement should be avoided. For example, the attempt to combine the subjective and objective methods in one statement leads to frequent cases of "cross-division", that is, the analysis of a group of taxa by more than one attribute at the same time, - a logical absurdity.
2. For control purposes each business should prepare its principal accounts according to one of the objective forms of account, such as the progressive functional method, the standard cost, or the product cost method.

3. In addition, it would be useful to prepare a simple statement in subjective form.

The research committees of the various accountancy bodies might profitably devote their attention to establishing principles for the design of accounts, so that precision and uniformity could be attained, to the advantage of all.

APPENDIX ONE

OVERHEADS SECTION OF ACCOUNTS CODE

01. Introduction.

This appendix contains the schedules covering accounts 200 to 599 in the code of accounts described in Chapter 8. Provision for direct materials and direct labour is made in main groups 000 and 100. The main groups 200 to 500 inclusive contain the remainder of the primary expenses, the latter being defined as accounts which cannot be sub-divided into two or more distinct types of expenditure.

The main groups are arranged broadly in the order in which they will tend to vary with changes in volume of activity, whether manufacturing or distribution.

Group	
200	Indirect labour and labour expenses
300	Indirect materials
400	General Charges
500	Fixed Expenses

The sub-groups are to a lesser degree also in order of variability.

Possibly indirect materials may be slightly more sensitive to changes in output than indirect labour, but it is thought preferable to place indirect labour immediately after the main group dealing with direct labour, so that groups 100 and 200 cover all labour charges.

02. Group 200. Indirect Labour and Labour Expenses

Let us now examine the construction of each main group, starting with labour. The sub-groups appear as follows:-

		Sub-Group
Weekly paid labour:	Indirect	201 - 209
" " "	"	210
" " "	"	220
" " "	"	230
" " "	"	240
" " "	Lost Time	250
" " "	Extra Payments	260
Monthly paid labour:		270
Employee Benefits:	Paid Directly	280
" "	Not Paid Directly	290

It is better to avoid using sub-group 201 to 209 if possible, as account 201 has to be used as the summarising account for 202 to 209 and this destroys the general rule that summarising accounts always end in the figure 0. In normal cases sub-groups 210 and 220 will be used for indirect labour, provision being made to segregate the following types:

General indirect labour related to a particular cost centre.

General indirect labour not related to a particular cost centre.

Supervision: e.g. superintendents, foremen, chargehands.

Technical staff (weekly paid) e.g. machine setters.

Inspection staff (weekly paid).

Clerical staff (weekly paid).

Subject to special circumstances, the sub-groups 230 and 240 are allotted to indirect labour on repairs and maintenance, and the account numbers should be linked with indirect materials, contractors' charges and the main capital asset groups.

If it is not found necessary to use all the sub-groups 210 to 240 for indirect labour, the succeeding sub-groups can be re-numbered so as to avoid using sub-group 290, as the "ninety" sub-group is normally used to denote miscellaneous taxa, and accordingly the use of such a sub-group should be avoided so far as it may be possible and convenient to do so.

The terms "wages" and "salaries" are not used, because they are not clearly defined. A job may be weekly-paid in one factory and monthly-paid in another. The use of the terms "weekly-paid" and "monthly-paid" as attributes of division is more satisfactory in a number of ways, such as indicating the source of the original book-keeping entries.

In direct labour within the 100 group descriptive appellations such as "machinist", "turner", "polisher" and so on are not usually required because the type of work is defined by the addition of the cost centre number. Alternatively, if there are numerous types of work in one cost centre which it is desired to analyse separately, this can be done by the use of an operations code along with a standard number such as 111. It is wise to reduce the number of accounts in use so far as is practicable without losing homogeneity, because the fewer the accounts in use, the easier it is to remember their names (numbers); moreover posting and summarising processes are quicker. With uniform descriptions, there are

fewer account titles needed on ledger cards and summary sheets, giving more scope for standardising and pre-printing stationery.

This does not mean that the descriptive term for each occupation need be dropped. All it means is that the majority of these terms will be coded on wage and job records according to the standard number. e.g. 111. There is no attempt or wish to destroy the picturesque language which helps to preserve human interest in the working group. Figures must be kept in their place. That is the object of this appendix: to show where their proper place is, and to get them there by the most direct route.

As for direct labour, there are countless terms for describing the occupations of men whose work is simply of an indirect nature. It is not at all necessary to encumber the accounts code with a host of superfluous terms. At the same time, each organisation should consider whether certain types of indirect labour are sufficiently specialised to require a separate account, as, for example, operators of mechanical trucks or overhead cranes.

In some cases, it may be possible and useful to use the accounts code to signify the different groups of wage rates.

If sub-group 210 should be found adequate for the general run of indirect labour, sub-group 220 can be reserved for the higher categories of weekly-paid indirect labour covering supervision, technical staff (setters etc.) and clerical staff. Time spent on training and learning may also find a place in this sub-group.

If there is a separate cost centre called "Inspection", it may be possible to make the last digit of the wage account tie in with the final figure of the cost centre number. The same remark applies to clerical wages which may be related to the cost centre number for works overheads, while the wage account for trainees may be integrated with the number of the cost centre dealing with training.

Sub-group 250 covers the portion of weekly-paid wages treated as lost time. The main reasons are generally those indicated by the three "M's", namely lack of Material, failure of Machine, or absence of instructions from Management. Any other important cause of lost time can be given an account in this sub-group, or if there are a great many causes of trouble which need investigation, a separate code can be made.

After excluding wages for work done on capital account, it may be possible to reconcile the total of main group 100 and sub-groups 210 to 250 inclusive with the normal weekly wages column of the pay-roll. However, this will depend on the system in force, and may not be needed in any case. Sub-group 260 and the foregoing sub-groups and group along with wages on capital account should be capable of reconciliation with the gross weekly payroll.

The arrangement of the sub-group for monthly-paid staff follows the sequence suggested for indirect workers other than general factory labour, but account 279 is used for Management and sundry staff whose salaries would not fall suitably into the other accounts shown in the sub-group.

Reference has already been made to the use of code numbers ending in the figure 9. The taxa included in such accounts are not necessarily unimportant, but they are items for which separate cost totals have not been requested. The pattern of each sub-group is therefore:

270 General "sub-total" account embracing all accounts between 270 and 279 inclusive.

271-277 Accounts for specific types of expenditure falling naturally within the given sub-group.

278 Account used for an item of a slightly different nature to accounts 271-278, although correctly placed in the same sub-group. e.g., training and learning; or account 288, make-up pay for staff in H.M. Forces.

279 Account to hold all taxa coded to the particular sub-group but not classified elsewhere in the sub-group.

Group 100 and Sub-groups 210 to 270 inclusive cover expenditure whose origin should be exclusively the wage and salary payrolls.

Two sub-groups have been allotted to other payments to or for employees. The first of these shows payments made directly to employees, such charges being derived either from supplementary payroll records or from individual entries in the cash book. From a book-keeping viewpoint, there is not the same ease in proving accuracy of posting as with the gross wages and salaries.

All the accounting information about employees is contained within the 100 and 200 groups, with the exception of time spent on capital work and also payments to employees for use of their own cars and cycles, the charge for which lies in account 433. Such payments are intended merely to recoup the employee for his out-of-pocket expenditure and so are a general expense of the business, rather than part of the employees' remuneration.

03. Group 300. Indirect Materials.

A full range of a hundred numbers has been left for indirect materials and if there is a separate stores classification of such taxa, the main group 300 can hold the first two stages of division of the indirect materials code, thus integrating the two codes. As codes for indirect materials vary widely from business to business, one can do no more than indicate some of the items most likely to appear in every code of this type.

From the book-keeping angle it is convenient to assign a complete main group to indirect materials. Subject to a few charges emanating from the invoices and the (petty) cash book, all the entries in main group 300 should arise from stores requisitions and credit notes.

04. Group 400. General Charges.

Payments for materials and labour have been covered by main groups 000 to 300. The remaining primary expenses fall into two groups, the second of which is devoted to fixed expenses (500). This leaves main group 400 for the other expenses incurred in carrying on a business. Into this group fall charges for what we may call "outside services". For example, a business may pay an outside firm to provide a regular lubrication service, instead of using its own staff, the latter equipped with oil-cans filled with oil issued from the indirect materials stores. In the latter case, the charges would fall into the 200 and 300 group of accounts, but if an outside firm is involved the debit falls into the 400 group. A careful scrutiny of this group may reveal opportunities

for employing an organisation's own staff more fully, although an outside firm specialising in a particular type of activity may be more economical despite the inclusion of the profit element in its charges.

05. Group 500. Fixed Expenses.

The term "fixed expenses" is merely a convention for those charges which move sluggishly for wide changes in the volume of output.

As depreciation comes last, the total of accounts 000 to 549 represents broadly over a period of time the cash expenditure on labour, material and overheads for revenue purposes. The figure will not be precise as materials issued from stores will usually have been paid for in some earlier period.

06. Mnemonics. General Construction.

Considerable care has been taken in an endeavour to make the code numbers mnemonic, as it is firmly believed that these apparently trivial devices improve the speed and precision of the book-keeping procedures.

As no individual items end in zero, or in six or seven, it follows that all account code numbers must end in 1, 2, 3, 4, 5, or 8 or 9. The latter figure is used for unspecified items, so that all specified items end in one of six digits. In addition, the figure 8 is to some extent reserved for items which, although in the correct sub-group are of a slightly different nature to those specified by items 1 to 5. In other words, the memory is assisted by the fact that the great majority of the expense accounts have one of the figures 1 to 5 as their final digit.

As the names of the main hundred groups are easily learned, there is comparatively little left to the memory, which is the intention.

The digits 6 and 7 have meantime been left as spare numbers, but any other digits could have been reserved for the insertion of additional taxa in the future.

Mnemonics are of little value unless conscious efforts are made to explain them to each person who will have to use the code. To be thorough, one should examine the accounts for which code numbers have to be used by each interested person. The mnemonic qualities of the code should then be illustrated from his point of view.

In some cases, there may be one or two exceptions to a mnemonic, but the writer's view is that it is better to have a mnemonic with an exception than to have no mnemonic at all. The mnemonic assists in the recollection of a number of items which would otherwise require to be remembered as disconnected taxa.

07. Office Charges.

The figure 5 is used as a key digit for clerical and office charges:-

Clerical wages, weekly-paid, say 225
" salaries, monthly paid 275
Stationery and office supplies 315
Depreciation of office machinery 555

08. Linked Items.

In many cases, two items are linked by their final digit, so that if one item in common use is known, it is easy to remember the other. This applies to:

Pensions	283	293
Training and learning	278	298
Lubricants and fuel oil	313	353
Waiting time and demurrage	253	423
Fees of rating surveyors and rates paid	472	522
Rent and depreciation of buildings	542	552

A small point to note is that the number for third party insurance is slightly significant, being 513.

09. Fixed Assets, Depreciation and Repairs.

The code numbers for indirect labour and indirect materials can be tied in with the various types of capital asset, as can payments to contractors for repair work. The charges for depreciation and the capital assets themselves can also be linked up, and for these ~~five~~ categories of account the code numbers can be designed to run as follows:-

	Indirect Labour	Indirect Materials	Contractors' Charges	Deprn.	Accum. Deprn.	Asset Account
Land	231	331	411	551	851	861
Buildings	232	332	412	552	852	862
Roads, etc.	233	333	413	553	853	863
Plant & Machinery	234	334	414	554	854	864
Vehicles	235	335	415	555	855	865
Fixtures, etc.	238	338	418	558	858	868

10. Car Expenses.

Charges relating to cars have 5 as a key figure:-

Indirect Labour	235
Petrol	315
Other Indirect Materials	335 (Including oil for cars)
Outside Work	415
Road licences	435
Car insurance	515
Depreciation	555

There are two exceptions to the above rule:

Car expenses not covered by the above items	432
Car allowances	433

11. Travelling Expenses.

Difficulty is sometimes experienced in obtaining accurate costs for travelling expenses because an executive may travel by train, by a car belonging to the company, or by his own car for which he receives an

allowance. The cost of travelling can be found by combining the following items:-

Indirect labour on cars	235
Petrol	315
Other indirect materials	335 (Including oil)
Outside work	415
Travelling sub-group	430 (431-439)
Insurance	515
Depreciation	555

Repairs to cars by outside firms fall into account 415. The cost of, say, a new battery should strictly be charged to the indirect materials account 335, but if included in an outside firm's invoice, it may for convenience be debited to account 415. A recurring charge for rent for garage space falls into account 542, although casual charges for garaging a car while on a journey would more readily be placed in account 432 for car expenses, as would charges for the temporary hire of a car.

12. Grouping into Nine Categories.

Let us now re-examine the nine categories of primary expenses.

Payments to and for the firm's own employees are covered by groups 100 and 200, excepting the payment of car and cycle allowances. (Account 433). Charges for materials are segregated by means of groups 000 and 300. A minor exception is the inclusion of samples and presents (461) in the advertising sub-group.

Payments for outside services are grouped as follows:-

Contractors' charges	sub-groups 410 and 420
Travelling, including personal services	sub-group 430
Communications	sub-group 440
Charges relating to money	sub-group 480
Sundry general charges, including minor services such as laundry work and vermin destruction.	Account 499

The use of facilities is covered by the sub-groups 540 and 550 apart from payments to employees for car allowances which come under account 433. Payments for information and knowledge are segregated in accounts 451 and 454.

As for protection, continuity and development, it is necessary to collect the information from four sets of accounts, these being:

Trade association, research, patent fees.	Accounts 455, 458, 459.
Advertising and publicity	Sub-group 460
Professional fees	Sub-group 470
Insurance	Sub-group 510

Ex gratia payments are all included in account 493, and charges for the use of purchasing power fall into sub-group 530.

Rates and taxes are covered by sub-group 520, this being the ninth and last category of primary expense.

It will thus be seen that with comparatively little work, it is possible to establish at any time the total expenditure under any required grouping of primary expenditure.

APPENDIX 1.

A C C O U N T S C O D E

MAIN GROUPS

000 - 099 Direct Materials

100 - 199 Direct Labour

200 - 299 Indirect Labour and Labour Expenses

300 - 399 Indirect Material

400 - 499 General Charges

500 - 599 Fixed Expenses

The above groups cover all the primary expenses.

600 - 649 Composite Expenses

650 - 699 Inter-departmental Cost Transfers

700 - 799 Sales, Cost of Sales and non-trading revenue

800 - 899 Assets

900 - 999 Liabilities, Share Capital and Reserves.

Note: The words "Not elsewhere classified" have been abbreviated in the following schedules to N.E.C.

ACCOUNTS CODE. Appendix 1.

MAIN GROUP 200. INDIRECT LABOUR AND LABOUR EXPENSES.

200 Summarising account covering accounts 201 - 299

INDIRECT LABOUR

201 Summarising account covering accounts 202 - 209

210 " " " " 211 - 219

220 " " " " 221 - 229

230 " " " " 231 - 239

240 " " " " 241 - 249

The range of accounts from 201 to 249 provides five summarising accounts for sub-groups and provision for forty-four individual items of indirect labour, including maintenance labour.

250 - 259 LOST TIME

250 Summarising account for 251 - 259

251 Waiting on MATERIAL (faults due to bad material)

252 " " MACHINE (e.g. breakdown)

253 " " MANAGEMENT (e.g. lack of work)

254 - 257

258 Time spent on attending committees

259 Lost Time N.E.C.

Appendix 1.

260 - 269 EXTRA PAYMENTS.

260 Summarising account for 261 - 269

261 Bonus related to output

262 Overtime premium

263 Shift premium

264

265 Merit awards not related directly to output

266 - 268

269 Extra payments N.E.C.

270 - 279 MONTHLY PAID LABOUR.

270 Summarising account for 271 - 279

271 Supervisory staff

272

273 Technical staff not primarily engaged on supervisory work

274 Inspectors

275 Clerical Staff

276

277

278 Training and learning (Monthly paid staff)

279 Monthly paid labour N.E.C. and including general managerial staff.

Appendix 1.

280 - 289 EMPLOYEE BENEFITS (PAID DIRECTLY TO EMPLOYEES)

280 Summarising account for 281 - 289

281 Holiday Pay

282 Sick Pay

283 Supplementary pensions

284 Lump sum and ex gratia payments to staff or dependents

285 Co-partnership payments (if any)

286 - 287

288 Make-up pay for staff in H.M. Forces

289 Direct benefits N.E.C.

290 - 299 EMPLOYEE BENEFITS (NOT PAID DIRECTLY TO EMPLOYEES)

290 Summarising account for 291 - 299

291 National Insurance

292

293 Pension Fuhd contributions by employer

294 - 297

298 Tuition Fees etc.

299 Indirect Benefits N.E.C.

Appendix 1.

ACCOUNTS CODE.

MAIN GROUP 300. INDIRECT MATERIALS.

300 Summarising account for 301 - 399

301 Summarising account for 302 - 309

310 Summarising account for 311 - 319 or wider range if appropriate

311 - 312

313 Lubricants

314

315 Petrol

316 - 317

318 Stationery etc.

319

320 Summarising account for 321 - 329 if required

321 - 329

330 Summarising account for 331 - 339

331 Maintenance material for land

332 " " " buildings

333 " " " roads, sidings, wharves etc.

334 " " " plant and machinery

335 " " " vehicles

336 - 337

338 " " " fixtures, fittings and furniture

339 " " N.E.C.

340 Summarising account for 341 - 349

Appendix 1.

350 - 359 WATER, FUEL, LIGHT AND POWER.

350 Summarising account for 351 - 359

351 Water

352 Coal etc.

353 Fuel Oil etc.

354 Electricity

355 Gas

356 - 358

359 Water, fuel, light and power N.E.C.

360 - 369

370 - 379

380 - 389

390 - 399

Appendix 1.

ACCOUNTS CODE.

MAIN GROUP 400. GENERAL CHARGES.

400 Summarising account for 401 - 499

401 Summarising account for 402 - 409

410 - 419 PAYMENTS TO CONTRACTORS FOR REPAIR WORK.

410 Summarising account for 411 - 419

411 Work done on land

412 " " " buildings

413 " " " roads, sidings, wharves, etc.

414 " " " plant and machinery

415 " " " vehicles

416 - 417

418 " " " fixtures, fittings and furniture

419 Repair work done N.E.C.

420 - 429 OTHER PAYMENTS TO CONTRACTORS.

420 Summarising account for 421 - 429

421 Carriage inwards

422 Hired transport, excluding hire of passenger cars

423 Demurrage

424

425 Carriage outwards

426 - 427

428 Warehousing charges

429 Other contracting work N.E.C.

Appendix 1.

430 - 439 TRAVELLING EXPENSES.

430 Summarising account for 431 - 439

431 Rail, road, air, sea travel

432 Car Expenses, excluding petrol

433 Car and cycle allowances

434 Entertainment

435 Road licences

436 - 438

439 Other travel N.E.C.

440 - 449 COMMUNICATIONS.

440 Summarising account for 441 - 449

441 'Phone - external

442 Telegrams

443 'Phone - internal and recording and amplifying instruments

444 Postages

445 - 448

449 Communication expenses N.E.C.

Appendix 1.

450 - 459 INFORMATION AND KNOWLEDGE.

450 Summarising account for 451 - 459

451 Periodicals, books etc.

452

453 Conference fees

454

455 Trade association subscriptions

456 - 457

458 Research Associations

459 Patent Fees and other payments for information N.E.C.

470 - 479 PROFESSIONAL FEES (excluding advertising agents.)

470 Summarising account for 471 - 479

471

472 Rating surveyors

473

474 Tax advisers

475 Audit Fees

476 - 477

478 Legal fees

479 Business consultants and other fees N.E.C.

Appendix 1.

480 - 489 CHARGES RELATING TO MONEY.

480 Summarising account for 481 - 489

481 Bank charges

482 - 488

489 Other charges (e.g. night safe facilities and cost of paper and canvas bags) N.E.C.

490 - 499 SUNDRY GENERAL CHARGES.

490 Summarising account for 491 - 499

491 - 492

493 Subscriptions and donations, excluding ex gratia payments to employees or their dependents

494 - 498

499 Other general charges N.E.C.

Appendix 1.

ACCOUNTS CODE.

MAIN GROUP 500. FIXED EXPENSES.

500 Summarising account for 501 - 599

510 - 519 INSURANCE.

510 Summarising account for 511 - 519

511 Fidelity guarantee insurance; cash, insurance stamps

512 Employer's liability

513 Third party

514 Fire (excluding cars, vans etc.)

515 Cars, vans etc.

516 - 517

518 Consequential loss

519 Goods in transit and other insurance charges N.E.C.

520 - 529 TAXATION.

520 Summarising account for 521 - 529

522 Rates

523 - 525

526 Taxes on Profits

527 - 528

529 Wayleaves and other taxes N.E.C.

Appendix 1.

530 - 539 INTEREST PAYABLE.

530 Summarising account for 531 - 539

531 - 532

533 Interest payable (specified)

534 - 538

539 Sundry interest charges N.E.C.

540 - 549 RENT AND HIRING CHARGES.

540 Summarising account for 541 - 549

541

542 Rent payable

544 Hire of Machines

545 - 548

549 Rent and hiring charges N.E.C.

550 - 559 DEPRECIATION.

550 Summarising account for 551 - 559

551 Depreciation of land

552 " " buildings

553 " " roads, sidings, wharves etc.

554 " " plant and machinery

555 " " vehicles

556 - 557

558 " " fixtures, fittings and furniture

559

APPENDIX TWO

ACCOUNTS CODE.

SKELETON LAY-OUT FOR COST CENTRE CODE.

MAIN GROUP

000	Manufacturing departments making parts
100	Assembly departments
200	Finishing Shops
300	Works Services (Steam raising, electricity etc.)
400	Works Overheads (Design and drawing office, methods, motion and time study department etc.)
500	General Works Administration (Works office, Purchase department, Personnel department etc.)
600	Composite Expenses Centres
700	Warehouse, Packing, Despatch and Delivery
800	Advertising and Selling
900	General Administration

Research and Development should be placed in the group most important in each set of circumstances.

APPENDIX THREE

FORMS OF ACCOUNTING STATEMENT.

01. Introduction.

The methods illustrated in the succeeding pages can be grouped as follows:-

1. Subjective forms of presentation.
2. Objective forms of presentation.
3. Accounts viewed from the angle of groups of persons, - the "Interested party" method.
4. Accounts viewed from the aspect of money and termed "Movement of cash" form of statement.

The examples are greatly simplified, to elucidate the distinction between one method and another. Stocks and work-in-progress are assumed to have remained constant. The gross sales always appear as £1,000 and the profit as £80, before national taxation. If the latter is included, the net profit after taxation is shown as £50. Rates, insurance, interest, depreciation and so on are the same in all the examples in which they appear as separate amounts.

02. Subjective Forms.

In the first of the two subjective methods, the primary expenses are entered according to the sub-groups shown in the code of accounts. The resulting statement is simple, easy to understand, and though of value for certain purposes, it should not be the principal statement on which a company bases its policy.

The second subjective method groups the expenditure according to the nine categories of primary expense described in Chapter Seven.

03. Objective Forms.

The first of the objective forms of account has been termed the "Progressive functional method", signifying the progress of direct material through various stages of manufacture and distribution. The accounts will usually be divided into two sections, the first for manufacture and the second for selling and distribution, this being done to allow for the difference between the quantity of goods made and the quantity sold.

Method Four shows a marginal cost presentation, in which all the expenses varying directly with sales are first deducted to reveal the margin for fixed charges and profit.

The fifth method relates to budgetary control and standard costs. The example is very much abbreviated but may serve to show the structure of this method of presentation.

In the Product Cost Method, the figures for the cost of goods sold represent the total factory or purchased cost and so include both variable and fixed charges.

04. "Interested Party" Form.

The "Interested Party" method shows how the value added to direct materials is divided between those who sell their labour and those who sell their purchasing power; that is, between employees and shareholders. The intention is to reveal to employees the proportions in which the divisible balance has been allocated.

05. Movement of Cash Form.

The Movement of Cash form arrives at the net profit by deducting any increase in liabilities from the increase in assets. The example is very much simplified.

1. SUBJECTIVE METHOD 1.

SALES OF GOODS			£1,000
Less: DIRECT MATERIALS		£400	
LABOUR COSTS			
Weekly paid	£200		
Monthly paid	40		
Benefits: Cash (Direct)	10		
Cash (Indirect) and in kind	10		
		260	
INDIRECT MATERIALS AND GENERAL CHARGES			
Indirect Materials	30		
Water, fuel, electricity and gas	10		
Payments to contractors	20		
Travelling expenses, Communications	10		
Information and knowledge	10		
Professional fees, Charges relating to money, Sundry general charges	10		
		90	
FIXED EXPENSES			
Insurance	10		
Rates	40		
Interest	50		
Rent and Hiring Charges	10		
Depreciation	60		
		170	
			920
Net Profit for Year			80
Taxation on Profit			30
Net Profit after Taxation			£50

2. SUBJECTIVE METHOD 2.

SALES OF GOODS			£1,000
Less: Current Production:			
1. Payments to and for own employees	£260		
2. Materials	440		
3. Outside Services	30		
4. Use of Facilities	70		
		£800	
Protection Continuity & Development etc.			
5. Information and knowledge	10		
6. Protection, continuity and development	20		
7. Ex gratia payments	(a) 0		
		30	
Use of Purchasing Power			
8. Interest		50	
Support of Social Framework			
9. Taxation: Local	40		
National	30		
		70	
			950
Net Profit after Taxation			£50

Note: (a) Less than £10

3. PROGRESSIVE FUNCTIONAL METHOD.

SALES OF GOODS			£1,000
Less: Manufacturing stage 1.	£300		
" " 2.	150		
" " 3.	340		
		£790	
Selling Expenses		70	
Distribution Expenses		60	
			920
Net Profit before Taxation			£80

Note: It has been assumed that general administrative expenses have been apportioned over the other headings.

4. MARGINAL COST METHOD

SALES OF GOODS			£1,000
Less: Expenses fluctuating directly with sales			450
Margin: 55% of Sales			550
Less: Other manufacturing, selling and administrative expenses		£380	
Rates		40	
Interest		50	
			470
Net Profit before Taxation			£80

5. STANDARD COST METHOD

SALES OF GOODS: Standard volume at standard prices and standard "mix".		£1,100
Less: Standard cost thereof		950
Standard Profit		£150
Less: Reductions in standard profit due to:		
Lack of volume of sales	£20	
Variation in selling prices	10	
Variation in sales "mix"	10	
Other variances	30	
		70
Net Profit before Taxation		£80

6. PRODUCT COST METHOD.

Product Type	Sales	Cost of Goods Sold	Gross Profit	Selling Costs	Balance
	£	£	£	£	£
1.	450	300	150	60	90
2.	250	150	100	20	80
3.	300	250	50	40	10
	£1,000	£700	£300	£120	£180

Less:	Rates	£40	
	Interest	50	
	Administration Charges	10	
			100
Net Profit before Taxation			£80

7. INTERESTED PARTY METHOD (ADDED VALUE).

SALES OF GOODS			£1,000
Less: Cost of materials, supplies, services and replacement of plant			570
	Added value		430
Less: Taxation: Local		£40	
National		30	
			70
	Balance available for distribution		£360
Divided thus:- Persons who give their labour			260
Persons who lend their purchasing power			50
Retained in business to assist continuity			50
	Total divided and retained in business		£360

8. MOVEMENT OF CASH METHOD.

	Debit		Credit
Decrease in assets	£ -	Increase in assets	£200
Increase in liabilities	120	Decrease in liabilities	-
	120		200
Net Profit before Taxation	80		
	£200		£200

APPENDIX FOUR

TREATMENT OF CERTAIN ACCOUNTS.

Precision in operating statements will be attained only if the contents of each ledger account are carefully defined and conventions made as to the correct place for each type of credit and debit. A few examples of items which often cause difficulty are mentioned below.

01. Royalties: If the payment is for technical information on the working of a special process, it may be treated as a payment for information, but if the fee is paid for the right to use a certain type of machine, it may be treated as part of the cost of that machine.

Should the payments be related to the quantity of a special direct material used, they may be classified as part of the direct material cost. On the other hand, if the royalties are computed on the basis of sales, they may be treated as a deduction from these sales or as a part of the cost of the goods sold.

Finally, the payment of royalties may be thought to be equivalent to an allocation of profit, because physically the goods could be made whether the royalty were paid or not.

An annual payment for the use of a machine is a fixed payment, but if it is based on material used or on sales the charge is a variable one.

To achieve uniformity of treatment, it might be agreed as a provisional measure that royalties should be treated as an allocation of profit. Payments for the right to extract and dispose of minerals

are not discussed here, as they are considered to be in the nature of a payment for a direct material.

02. Taxation: It may be difficult to record the total tax suffered. For example, can one always ascertain the total purchase tax on goods bought in a finished state? However, a reasonably close estimate can probably be made. In the absence of any good reason to the contrary, purchase tax should be charged to the same account as the goods bought. In addition to purchase tax, and taxation on profits, there are road licences, customs and excise duties, stamp duties, including that on cheques, and the large sums paid to national insurance funds.

03. Carriage Inwards: Carriage inwards will usually be added to the cost of the goods purchased, but where it may be difficult to identify the charges with particular consignments, a cost centre can be opened to deal with handling charges, the expenses being added to, or pro-rated over the goods each period.

04. Bad Debts: If it be agreed that primary expenses cover all expenditure of a business, and if one asks oneself to whom a bad debt is paid, it becomes clear that bad debts are not a type of expenditure, but rather a deduction from income. It is therefore proposed that bad debts should be deducted from sales at an early stage in the subjective form of accounts. In the objective form, it could be considered more appropriate to charge bad debts to either the administrative or selling functions.

05. Value of Scrapped Work: In the same way, it can be considered that scrap is not an expense but merely a deduction from the value of goods produced. In many cases, however, scrap will not be identifiable with any batch of goods, and can be shown as a deduction from the value of factory output.

Alternatively, the cost of scrapped direct material can be included with the material charge for the goods made. It may be added to the cost of a specific batch or article, or it may be treated as indirect material in the overhead section of the accounts.

The cost of labour on scrapped production can be included as an element of indirect wages. The known percentage of wage and material costs can be used for splitting the value of scrap between indirect wages and indirect material. If it is desired to avoid these calculations, the value of scrap may be recorded in sub-group 90 of the direct materials main group 000.

06. Rectification of Defective Work: The time spent by direct workers on rectifications of defective work can be treated as a special indirect labour cost in the Lost Time sub-group 250.

APPENDIX FIVE

BUILD UP OF EXPENSE IN COST CENTRES

The code of accounts is arranged so as to provide separate groups of accounts for each cost centre, showing:-

1. The total of primary expenses incurred.
2. The total of composite expenses peculiar to the cost centre.
3. The total of transferred charges.

Transferred charges relate to services such as electricity generated on the works, steam consumption, water, gas and so on. In these cases consumption is metered (though seldom done adequately) or computed in various ways.

There are other expenses which are not occasioned directly by any one cost centre but which can be spread over the activities of a business on some logical basis. Interest is one of these. Arguments as to the rights or wrongs of spreading interest have not been lacking but it is not intended to enter the arena. If, however, it has been decided to charge out interest from the central pool of general payments made on behalf of the whole business, interest can be apportioned in proportion to the money tied up in each cost centre.

Interest is a primary expense but one divorced in nature and in time of origin from the day-to-day labour and material charges arising in production cost centres. It may be termed an "apportioned charge" to distinguish it from composite expenses arising in various cost

centres and likewise to distinguish it from allocations of general overhead charges made on some more or less arbitrary basis. The object is to show clearly the proportion of the expenditure charged in each cost centre related with complete accuracy to its activities, and the proportion which is to a greater or less degree the result of computations and estimates. The apportionment of interest to cost centres should be sharply differentiated from the allocation of general overheads over departments and cost centres.

If these distinctions are observed in framing statements for supervisors and foremen, it may help to bring home the extent to which the costs are under the direct control of the man on the spot. Normally, of course, a cost statement for a foreman will not show expenses over which he has no control. Yet there is no discrete line between what the foreman can control and what he cannot: it is a question of degree, - hence the desirability of designing expense records to reveal the above groups of charges separately.

APPENDIX SIX

CLASSIFICATION OF BALANCE SHEET ITEMS

01. Introduction.

Confusion sometimes arises in the classification of balance sheet items because of failure to distinguish between the total of a kind of asset or liability, and the total amount due by or to a certain category of person. For example, if it is desired to show the total amount of accrued interest at the balancing date, this can not be done if at the same time part of that interest is included with a current account balance relating to a particular party. Similarly, if liabilities are segregated into current liabilities and provisions, an item may appear under both headings, thus preventing one total being stated for that particular item, such as income tax. Are the items to be arranged according to the type of item, or the type of person to or from whom money is owed, or according to the date when it is expected money will be paid or received?

As with operating statements, it is possible to have an "interested party" type of balance sheet, or balance sheet in "Personal" form, as distinct from a statement of assets and liabilities in "Impersonal" form.

A balance sheet can be regarded as either a list of possessions and monetary claims, or as a statement of liquidity and financial worth.

02. Balance Sheet in Personal Form.

Let us examine a few balance sheets, the first being arranged in "Personal" form.

BALANCE SHEET AT ../../.... PERSONAL FORM

Amount due to:	Shareholders:	Share capital	£2,000	
		Reserves	500	
				£2,500
	Lenders (Debenture holders)			700
	Inland Revenue			100
	Bankers			-
	Creditors (trade and other)			200
				£3,500
Less due by:	Debtors		£600	
	Bankers (cash in bank)		100	
				700
		Net Amount Owed		£2,800
What it is owed for:	Stocks		£800	
	Capital Assets		2,000	
				£2,800

It is difficult to convert the last two items into a personal form, but the same difficulty does not arise with the "Impersonal" form of balance sheet shown next.

03. Balance Sheet in Impersonal Form.

BALANCE SHEET AT ../../....		IMPERSONAL FORM
Cash held in bank	£100	
Goods sold but cash not received at date	600	
Stocks	800	
		£1,500
Less: Goods and services received but not paid at date	£200	
Taxation not discharged	100	
		300
Net Current Assets		£1,200
Add: Capital assets (Plant, machinery etc.)		2,000
Net Assets of the company		£3,200

Sources of Net Assets:

Cash paid in by shareholders	£2,000
Profits retained in the business	500
Cash paid in by debenture holders	700
Capital Employed	£3,200

04. Balance Sheets Analysed according to Liquidity.

We may also consider the arrangement of a balance sheet from the point of view of liquidity, by analysing assets and liabilities according to the year in which they will be realised or discharged. This method of arrangement is appropriate to the needs of banks and other financial institutions.

As regards trading companies cash in bank is already liquid and most trade debtors will have paid their accounts within the twelve months following the date of the balance sheet with a portion carried over to the subsequent twelve months. Hire Purchase balances will become liquid over a period of years. Stocks of finished goods may be sold and cash received within twelve months, or the following year. Many investments can be realised immediately, but it may not be desired to realise trade investments and an indefinite number of years will elapse before they are sold and become liquid.

Capital assets have been called deferred revenue expenditure, a portion of which falls into charge each year. The assets are used to make goods to produce sales which produce a flow of ready money. In this way the capital assets become liquid. We therefore get the paradoxical proposition that next year's depreciation is a current asset, because that portion of capital assets will have been written off by the end of the succeeding year.

We could therefore arrange a balance sheet in columnar form, the headings being 1 year, 2 years, 3 years, 4 years, 5 years and "later periods". Each asset would be apportioned over these columns

appropriately, with the same procedure for liabilities. For example, income tax liabilities might be spread over all columns according to the estimate of the time when amounts set aside would turn into current liabilities.

The purpose of this exposition is to explain that assets and liabilities cannot be divided between current and fixed merely by name: the exact nature of each item must be examined.

In the gas industry, it is the practice to hold a stock of meters available for installation when the premises of new consumers are connected to the supply, on which event the meter is transferred from the stock of meters account to the fixed asset account for "meters on consumers' premises". This implies that a definition is needed of current assets which would prevent such items as meters being classified in this way without any note of explanation. A few meters may be sold to members of the public, but this is against the general run of affairs.

A similar type of situation exists as regards main pipes, many or most of which will be used in the laying of new gas mains, though some are used for repair work.

In the published accounts of the gas industry hire purchase balances are not classified as current assets, although an appreciable portion of such balances will become liquid during the succeeding twelve months. This merely emphasises the need to decide in advance by which attribute the accounts are to be classified; by nature of item, by person to whom or from whom money is owed, or by order of liquidity. It is suggested that the most generally practicable method is by nature of item, and this principle should be followed throughout; there should be no mixing of methods.

In addition, one could provide a statement listing the assets and liabilities in order of liquidity. For assets it would be appropriate to group maintenance stores in proximity to manufacturing plant, except for the budgeted consumption of stores in the next financial year, such amount being treated as a current asset. The statement would appear somewhat as follows:-

	Period within which assets will or can become liquid.					
	1 year	2 years	3 years	4 years	5 years	Later
	£	£	£	£	£	£
Cash	50					
Debtors	200	30	10			
Hire Purchase balances	40	40	40	40	40	160
Other debit balances	10	100				
Investments: Trade						500
Other	350					
Stocks: Direct materials	1,000	300	200	100		
Indirect materials	500	150	100	50		
Work-in-progress	130	50				
Finished Goods	5,000	600				
Fixed Assets	800	800	800	800	800	10,000
	£8,080	2,070	1,150	990	840	10,660

Liabilities would be treated in a similar manner. The figure of £800 for fixed assets for the first five years is the depreciation to be written off on assets in use at the balancing date.

Such a statement may only be required on special occasions, but it does illustrate the present weakness in trying to classify every asset as either wholly current or wholly fixed.

APPENDIX SEVEN

THE ACCOUNTS MANUAL

01. Introduction.

The designing of an accounts code should be followed by the preparation of a comprehensive manual providing schedules and definitions of the accounts and cost centres along with a description of the system for which the accounts and cost centres provide the framework. Codes themselves do not constitute a system although they should be capable of fulfilling the requirements of the system ultimately adopted for presenting accounting information to management.

The accounts and cost centre codes described in Chapters Eight and Nine are constructed so as to suit any set of requirements. The purity of the primary expense section combined with the entirely separate cost centre code constitutes the distinctive and fundamental difference between this scheme and the "ad hoc" codes generally found in industry and commerce. A code prepared for a single purpose is frequently unable to cope with new items, and the extraction of information in any but the original "ad hoc" form becomes a laborious and intricate problem.

It is not enough to classify the accounts and assign appropriate symbols: the thought behind these processes must be translated into a practical form for every-day use, and the Accounts Manual is the principal tool in achieving this aim.

02. Purposes of the Manual.

The Manual sets down what has been classified along with the related symbols; it provides schedules of the accounts and cost centre codes, shows how these are linked in the accounting processes, how expenditure should be allocated to cost centres and how certain accounts should be treated.

The Manual also aims so to define each account that expenditure and income find their way to the appropriate location.

03. Contents of the Manual.

The Manual will include some or all of the following sections:

1. Introduction: this will state the purpose of the Manual, the operative date, and the names of those who have compiled it.
2. Schedule of Accounts with Code Numbers: this is a list of the taxa, with here and there a brief note on the meaning of an account title or its relation to some other account.
3. Schedule of Cost Centres with Code Numbers: this is similar in form to the schedule of accounts.
4. Chart of Cost Centres and Accounts: On this chart the number and title of each account are entered in sequence down the left side of the page with similar data for the cost centres forming column headings. In this network crosses are inserted to show the accounts needed for each cost centre.

5. Details of Accounts in each Cost Centre: Taking each cost centre in turn, the related expenses are described in detail, with an indication of any items specially included or excluded. Much work is involved in making this extensive section both comprehensive and accurate.

6. Index to Manual: An index assists in assigning correct account numbers to items but vaguely defined and it helps to prevent the opening of a new account when an existing one will do.

In course of time a register of amendments will become necessary, each item being inserted in the appropriate place in the Manual.

One of the principal aims of the Manual is to assist in the preparation of informative accounting statements, so it is pertinent to include a skeleton Form of Accounts, indicating the cost centres and accounts relevant to each item. This done, it will usually be desirable to describe the treatment of certain accounts, so as to avoid ambiguity.

Against each account in the code there should be a letter to indicate the method of allocation; for example:

A. Items charged direct to the relevant cost centre.

B. Items charged to certain General Overhead Cost Centres only, such as those for Manufacture, Distribution and Administration.

C. Items charged to the Cost Centre for general administration and retained there.

It may also be useful to recast the Manual in "functional form", having for each activity the skeleton of the relevant section of the Accounts, along with indexed notes on the method of completion. There follows the cost centres and accounts involved with full description and definitions. This arrangement is of service to the clerk responsible for each distinct activity.

04. Preparation of the Manual.

In preparing a new manual, the first step is to make a list of all the primary expenses connected with the business, segregating any composite expenses or transferred charges. The primary expenses are then fitted into the standard layout described in Appendix One.

The second step is to study carefully the manufacturing processes and then to make a list of the cost centres in sequence of manufacture. When in addition the service and administrative cost centres have been listed and classified, one can draft the cost centre code, leaving appropriate space for expansion.

At this stage, notes are prepared on the allocation of primary expenses to cost centres to avoid dubiety on treatment of any payment. This is especially important for comparing the results of factories making similar products.

There follows the task of designing the Form of Accounts and assigning cost centres and account numbers to each item.

Finally, one prepares the index and a glossary of terms, groups of related accounts being checked to ensure uniform terminology in the descriptions.

05. Conclusion.

It has been said that as soon as the Forth Bridge has been painted from one end to the other, the workmen start again on their perennial task: so it is with an Accounts Manual. It is no sooner completed and subjected to the stresses and strains of operation than additions and amendments are found desirable. Prompt attention to such needs will encourage the staff to rely on the Manual for guidance in operating the whole accounting system and when this is so the Manual will have achieved its object.